"Journal of Gas Lighting, Water Supply, and Sanitary Improvement."—Sept. 19, 1916.—Registered as a Newspaper.

Journal of Gas Lighting and Water Supply

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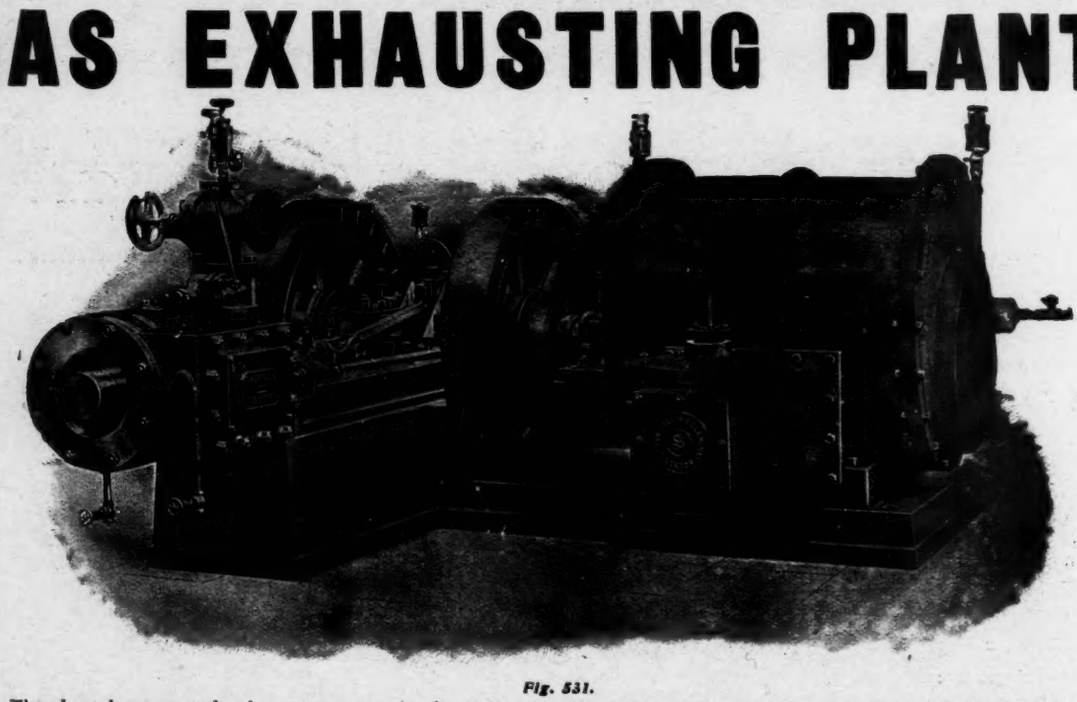

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JOURNAL OF GAS LIGHTING & WATER SUPPLY.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CXXXV., No. 2784.] TUESDAY, SEPTEMBER 19, 1916. [68TH YEAR.

EDITORIAL NOTES.

Other Developments in Gas Legislation.

THE financial changes that are to be found in the Gas Acts of the current parliamentary session formed the subject of editorial reference last week; and it was then intimated that, though the measures were few in number, there were other features of considerable interest to which it would be useful to accord greater prominence than was given by the recently published review of the provisions. Calorific power is to the fore in most of the Acts; and, more frequently now than formerly, it is seen that a calorific power standard is adopted free of any encumbrance in the way of a margin—that is to say, 500 B.Th.U. (total heat test) is favoured, instead of 540 B.Th.U., with a margin of 7½ per cent.. In association with the calorific clause, the supply (upon request, and during a specified period) of flat-flame burners suitable for gas of the quality prescribed, is often put upon the promoters as an obligation; but this session, as was the case with the Gas Light Company in 1914, the Colchester Gas Company are required to supply, if the demand is made, at any time within two years, one incandescent burner to any prepayment consumer in exchange for a flat-flame one. Of course, the consumers generally have to pay for this; but no doubt it is a good advertisement, and will be advantageous with time in inducing universal adoption among the prepayment consumers. For them incandescent lighting is a good investment, and gas undertakings should do all that they can to encourage it.

A still more important change is in connection with the minimum pressure of gas supply. The old 8-10ths of an inch minimum prescribed by the model clause is now a "back number," and does not accord with modern uses and demands. For the last five or six years, the track of change in this regard has been developing itself, more particularly in 1914. And the Board of Trade and the Local Government Board have now been empowered, by the Gas (Standard of Calorific Power) Act, to alter, if thought fit, the existing prescriptions as to minimum pressures in the Acts of those undertakings that are making application for the transference of standard from illuminating power to calorific value. There can be no real objection to the raising of the minimum pressure so long as there is reason in the prescription, and local distribution conditions are taken into account. And, forsooth, if distribution conditions favour the old 8-10ths minimum, then it is time that the conditions underwent some modification. Important changes in minimum pressure obligations were made in Parliament in 1914, though in 1912-13 the "thin end of the "wedge" had been driven in. In 1914, in the Liverpool and Edenbridge Acts, a minimum of 12-10ths was prescribed; in the Skegness Act 15-10ths; and in the Isle of Thanet Act 2 inches. In 1915, there was a little batch of Acts with 10-10ths and 12-10ths as minima. The Colchester and Newcastle Companies are now put at 15-10ths; but the Folkestone Company have had imposed a minimum of 2 inches—the minimum of the Isle of Thanet Company—from sunset to 10 p.m., and at all other times 12-10ths. A variable minimum as between day and night is nothing new. Several Acts and Orders of past years contain a prescribed minimum of 6-10ths for the day and 8-10ths for the night. But these minima now only exist until the opportunity comes for changing them; and it is not at all probable that they will be again specified. While on the subject of distribution, it may be mentioned that there seems to be rather more looseness than is good for an industry fighting for greater freedom in the agreements entered into with county councils and other local authorities. Such bodies have been very busy in the few Acts of the session in getting depths of pipes prescribed, and in obtaining on their own account exemptions from liability for damage, as well as in imposing new obligations upon gas undertakings. They are accumulating a goodly list of precedents, and all through the leniency of gas undertakings born, no doubt, of a desire to live in amity with local authorities whose grace assists in the lessening of friction. But unnecessary concession on the part of gas undertakings means increased cost; and in bowing to the full extent to the unreasonable will of county councils and local authorities, permanent mischief may be done to the undertakings concerned.

In the matter of the limitation of the residual products purchase powers by gas undertakings, our Private Bill legislators are showing a striking inconsistency not only in respect directly of the limitation, but in respect of national needs. The antagonism—not the justice—of the Private Bill authorities and of one or two opinionative Chairmen of Se'ect Committees has over-ridden the recommendations of the Joint Committee of the two Houses, and led to what is now known as the one-third purchasing restriction, which was not insisted upon in some measures of the 1915 session. This inspired the hope that absolute free trade was coming into ascendancy in this matter in accordance with the recommendations of the Joint Committee; but the hope was badly founded. All the Bills that omitted the one-third purchasing restriction this session had it inserted before they attained the status of an Act. And this despite the fact that anyone with brains must recognize that for the entire country it is the most economical thing to work up the liquid products of gas manufacture as near as possible to the place of production. No such restriction exists in Germany; and it is German competition that this country has to meet above that of all other countries. It must surely be to the greater advantage of this country, for instance, that the primary distillation of tar should take place in proximity to the place of production so as to obtain the bases for dyes and many chemicals in the most economical manner, and at the same time realize a tar with all those substances removed from it that are not an advantage for local road purposes, but are of use in other industries. Railway carriage of the residuals in the gross form to tar distillers and chemical manufacturers, is an expensive item in many cases; and when the work of extraction from the crude material is in comparatively few hands, then the industries that require the derivatives have to pay more than if there was extended manufacture and competition for custom. The gas industry has, during its career, learned a good deal about the transactions of some tar distillers, and especially since, through the washing of gas by tar, the tar has had its value enhanced, for which enhancement many small undertakings have been unable to obtain from the distillers any increase of price. Another argument for freedom is found in the developments that have taken place on gas-works during the war. Solely for military purposes, plant has been put down to wash gas in order to obtain benzol, toluol, and other necessaries; and distillation plant has likewise been installed. Without all this new work, the country and its Allies would, there is no question, have hopelessly failed in the war against a foe at one time better equipped; and the disaster would have indefinitely burdened the nation. The greater the freedom in the working-up of gas residuals, the more stable will be not only the economic position of a number of home industries in respect of the provision of raw materials, but the military safeguards of the country.

The present parliamentary session, through the action of the Private Bill authorities, has magnified the reasons for the shareholders of gas undertakings forming distinct companies outside their statutory concerns for local co-operative schemes for dealing-in and treating the products of the residuals of gas manufacture. If this is the ultimate result of the action of the Alkali Manufacturers' Association and of the parliamentary injustice that has been done after the

complete consideration by the Joint Committee of the points at issue, there may be much cause for deep regret in certain quarters. However, in connection with this matter of residuals, the Plymouth and Stonehouse Gas Company have secured powers to acquire the business and property of the late Mr. Thomas Henry Harvey, relating to tar distillation and the conversion and utilization of gas residual products, and to enter into agreements to purchase tar from producers in Devon and Cornwall, and from any other company, local authority, body, or person any gas residual products other than tar. This is a step of no small importance to the gas industry. It is a change that was bound to come, and a change that inaugurates a development that not even Acts of Parliament can stop, although the course taken in the development may not be a statutory one, owing to mistaken obstruction.

Local Authorities and the Calorific Standard.

THE history of gas legislation shows that the progress of the gas industry has always been dogged by local obscurants. But permanent impeding of movements in development is generally an exceedingly difficult matter; and so ultimately, though the movement may in consequence of obstruction be slowed-down, the gas industry has, as a rule, succeeded in achieving its legislative object. The applications that are now being made under the Gas (Calorific Power Standard) Act are threatened, in a few cases, with the opposition of local authorities; but the opposition can only at this time of day bear a negative result. The investiture of the Board of Trade and the Local Government Board with the power to grant the transfer of the standard from the obsolete quality of illuminating power to calorific value has not been made hastily or without knowledge Parliament has been guided by what has gone before. For years by the authority of Parliament, and under the conditions laid down by the Metropolitan Gas Referees, the gas all over the metropolitan area was tested for calorific value for information purposes; and the London County Council has since been a consenting party to the change of standard in the case of the Gas Light and Coke Company, the South Suburban, the Wandsworth, and the Brentford Companies. Many provincial local authorities and companies have also made the change from the one standard to the other. The long discussions in Parliament resulted in the formulation of a definite standard, with —unless very special reasons can be shown for a departure from it—500 B.Th.U. (total heat test) as the quantitative condition or, alternatively, 540 B.Th.U., with 7½ per cent. margin before the penalty applies, which is simply an excrescence, and is now commonly ignored—a level 500 B.Th.U. being preferred. Besides this parliamentary settlement of the whole question, we have now other important local authorities owning gas undertakings applying, under the new Act, for the change, while corporations owning electricity concerns are opposing the applications made by the companies supplying gas in their administrative areas. For instance, the Leeds Corporation are applying for the new standard; the Sheffield and Cheltenham Corporations are opposing the applications of the local Companies.

The grounds of opposition by these Corporations are precisely those that it was anticipated would be selected, if any local authorities were so ill-advised as to put themselves in a position of hostility. In taking the action they are doing, the onus will be upon them of showing how it is that all the ill that they imagine, or are advised by persons who cannot possibly be aware of the facts, will issue from the change has not resulted in the case of those undertakings that are working under a calorific standard of 500 B.Th.U., or 540 B.Th.U. less 7½ per cent. before reaching the line below which penalties for default begin. It may not be known by the opposing local authorities that, apart from the new Act, no less than 48,742,872,000 cubic feet of gas out of 206,474,473,000 cubic feet sold in the United Kingdom by statutory concerns, or 23·6 per cent. (these figures are calculated from the pre-war returns to the Board of Trade), are already under, with two or three exceptions, calorific standards, and not an illuminating power one. However, the electricity-supplying local authorities are "dissembling their love" for the users of flat-flame burners. Say the Sheffield, Cheltenham, and other corporations: "These poor creatures will be put to an "unreasonable expense in changing from flat-flame burners "to incandescent ones." The fact is that every hour these consumers are using flat-flame burners they are ignorantly putting themselves to unreasonable expense; while conversion from the one type to the other will speedily recompense them, and continue to both enhance illumination and save expense. Then the corporation opponents appear to think that a standard of 500 B.Th.U. is not high enough. The figures quoted above as to precedent are substantial ones. It is also clear they know little or nothing as to the difficulty of getting a proper admixture of air with a high-grade gas under the conditions of use; nor of the fact that the larger the amount of air required for complete combustion, the greater the amount of inert constituents introduced to the gas, and therefore the larger the amount of heat uselessly removed by them in passing away as products of combustion—thus reducing the temperature of the flames.

If they knew more of the scientific aspects of the use of a reasonable calorific power (500 B.Th.U.), they would not make such random assertions as Alderman Styring did, at the meeting of the Sheffield City Council last week, as to "a great deal more" gas having to be consumed in gas-engines and in cooking stoves and fires. Actual experience, too, does not corroborate the generalizations advanced in ignorance, nor even the extraordinary piece of hyperbole that the result of the change of standard would result in the Sheffield Company saving £30,000 per annum, while the consumers would have to pay an additional £66,000. It would be interesting to learn the name of the expert who has advised the Corporation to this effect, and to ascertain from him the details on which his wonderful estimate has been based, and whether he can point to the accounts of any company or local authority concern that illustrate what he advances. Before the war, the Gas Light and Coke Company, the South Suburban Company, and the Wandsworth Company had been reducing the charges for gas to their consumers; and the percentage rate of increase in consumption was not abnormal—in fact, in years when calorific power was only being discussed as the prospective standard, in view of the small percentage used for the production of luminous flames, the rate of increase in consumption was in many cases greater. Imagination, too, speaks of gas undertakings going to make enormous profits by the change of standard; and reductions of price are talked of as conditions attaching to the alteration. Such conditions have not been made by Parliament; the sliding-scale in the case of the companies, and the financial regulations imposed by Parliament, to say nothing of competition, protect the consumers in well-attested fashion. Novels are not the only places where fiction is found. It is found in, among other quarters, town councils; it is sometimes found in cases prepared for the "edification" of town councillors with the view of stimulating them to action.

Coal Control.

IT is hoped by many large coal users (and by small ones too who interest themselves in the matter) that the Government will henceforth do more than it has done in the past to regulate the coal business—not nationalize it, but bring it under statutory control, so that the country may be safeguarded in the matter of supplies, and protected from the flights of prices which, on the slightest pretext, many of the colliery owners under agreement cause them to take to their own advantage, but which advantage is consistently and blandly denied. After the great coal strike of 1912, we well remember (the late) Sir Corbet Woodall severely criticized a condition of things which compelled an industry statutorily regulated at every point as is the gas industry having to rely for its raw material upon an industry with the freedom of manipulation possessed by the coal owners, and unregulated in any particular in regard to prices, which prices affect the controlled prices and working conditions of the gas industry. He then submitted that there was nothing that stood in the way of protecting the country and its industries against a coveteousness that was unscrupulous in its opportunities. Arising out of the war came the Price of Coal (Limitation) Act, and the Coal Exports Committee, which have between them proved that the coal industry is as susceptible to regulation as the gas, water, and electricity industries and the railways, though the Price Limitation Act has not been equal to the artifices of the coal owners in obtaining a monetary pull beyond the prescribed limits. If the case for statutory regulation was strong three or four years ago, it is much stronger now; and the coal owners have helped to make it so.

Even the miners, who have shown a well-developed

capacity for looking after themselves, are sickening of the effects upon the working classes of the money-grabbing policy; and it was recently seen that they have, through the threats of their Federation, brought to bear pretty good influence in the right quarter in relation to the question of raising the standard excess price, as was done in South Wales. There is little question that applications for an increase of the standard 4s. would have flowed freely to the Board of Trade had it not been for the prompt action of the miners, and the manifest trouble that further concessions would have had in store for the coal industry and the country at large. The Government recognize that the Miners' Federation is now a power in the land; and it is as well to acknowledge this, so long as the Federation does not use its power in an autocratic manner. Whether or not it is free from fault in this particular, is not a point on this occasion. But a noticeable point is that recognition of the position of the Federation was again made last week when, at the request of Lord Milner (who is now acting as the supervisor of the several Committees appointed by the Government to deal with matters affecting the coal trade), the Executive had an interview with him. There has been much speculation as to what transpired at the interview; but in one quarter it was stated that it was understood the conference was arranged for the purpose of considering a proposal with regard to the future of the coal industry and coal prices. "The proposal is believed to "include a greater control by the Government over the coal "industry than has hitherto been the case." More definite is another statement: "Viscount Milner's proposal is that "the Government should act as the nation's coal merchant, "and that all coal not distributed by the Government at "present should be distributed by the State." This perchance may only be an intelligent guess; if true, then there will be some curiosity as to the details of the scheme. But everything points to this, that the accrued conditions that govern coal prices and supplies—not only now, but in peace times—seriously jeopardize the interests of the country; and, in defence of these interests, this state of things cannot be permitted to continue indefinitely. If, unfortunately, it is allowed to continue, then the conditions will only go from bad to worse, to the loss and discredit of the country.

Annual Report of the Livesey Professor.

In another part of the "JOURNAL" will be found the annual report of Professor John W. Cobb, as the occupant of the Livesey Chair at the Leeds University. We regret for the Professor's sake that he has not something more solid to report; but even the Department of Coal Gas and Fuel Industries has to submit to national needs in the great European crisis. The students and assistants of the department, and a number of young men who would otherwise have been students, are fighting for the country, or are engaged in its munitions work. But the department has not been idle. It has largely transferred its attentions from normal work (which, it will be noted, has not been altogether discontinued) to work of a national character. The Ministry of Munitions has been utilizing its services; and work concerning the production, testing, and so forth of toluene, benzene, and other at present much required constituents of coal tar, has been proceeding with the energy permitted by the depleted man-power of the department, supplemented by the zeal of Professor Cobb and those whose help he could command. The gas industry, closely associated as it is with the department, will be glad that it is not in a dormant state (were it so, it would be through no fault of its head), but is able to render useful assistance to the country in the great emergency.

Police Powers and Street Lighting.

A point which may have some application at the present juncture has been ventilated in the query column of our contemporary the "Justice of the Peace," who from time to time find themselves invited to answer in this section of the paper questions on matters as far asunder as the Poles. Among others, a correspondent lately invited an opinion on a contention by the police in his urban district that clause 2 of the Lights (England and Wales) Order of July last empowers their chief officer to require the district council to light such of the street-lamps as he directs. He himself, on the other hand, submitted that no such power exists; and he pointed out that at a date earlier than that of the issue of this particular Order, the "Justice of the Peace" had published the following statement: "In London, a duty is imposed on the borough councils to cause the several streets within their districts to be well and sufficiently lighted (under the Metropolis Management Act, 1855, section 130). Outside of London there is no such duty generally imposed, nor is there any duty at common law, or under the Highway Acts, to light streets or highways." Clause 2 of the Lighting Order here referred to contains the words "except such public lamps as the chief officer of police directs to be kept in use for the public safety;" and apparently this is what has led to the claim being made to the possession of power to require the lighting of particular lamps. The correspondent reads these words as being merely an exception to a prohibition, and not as conferring any right upon the police to order the local authority to light any lamps which they would otherwise leave unlighted. This view of the matter is agreed with by our contemporary, who remarks that the Defence of the Realm (Consolidation) regulations, 1914, constitute the authority for the Order; and these regulations empower the Secretary of State to direct that lights shall be extinguished or obscured. He may also require vehicles to carry lights. "But the regulation does not empower him in any other respect to require lights to be provided or public lamps to be kept in use. The Order must not be read with the regulation, and could not extend the power conferred by the regulation."

Labour after the War.

It is too good to contemplate that, after the war, there will be a "new heaven and a new earth" in the industrial world, and that capital and labour will thereafter work in unity. But though too good to contemplate, there is no reason why it should not be so. Experience has demonstrated the actual realization of such a condition. And though capital and labour have hitherto in the majority of industrial areas had a great barrier existing between them, and have seemed to occupy vastly different and opposing spheres, no time could be more propitious for attempting a reconciliation, and of establishing new working conditions, than while the grand lesson of the force and might in the world of united effort is being held up to the country through the war. It has shown us how puny in comparison have been the causes and the objects of internal dissension that have had life and issue through the incoherence of our industrial parts; and it has shown us, too to what a higher standard of industrial living and operation we can ascend if there is the will. Aspirations that things would be vastly altered were breathed, at the opening session of the recent Trades Union Congress, by the Lord Mayor of Birmingham (Mr. Alderman Neville Chamberlain); and we see no reason why these aspirations should not materialize. The war has developed a new spirit of unity, and this new spirit must, if we are to succeed with the fulness that opportunity presents, be carried into the affairs of industry after the war. Great problems confront; and they cannot be tackled with sufficiency without all who people the industrial world make up their minds to effect for the purpose a proper co-operative alliance. Mr. Chamberlain thinks, among other things, that the workers should have a larger share in the distribution of wealth that they help to create, and that an attempt should be made to give greater regularity of employment, in connection with which he suggests that the trade union leaders should be occasionally admitted to the counsels of the employers. Very much the same thing was suggested at the meeting of the British Association by Professor A. W. Kirkaldy and in a report on the means of the promotion of industrial harmony. In this instance, it was thought that permanent Boards or Committees should be set up in each industry to consider matters of common interest, with a National Board to which the Local Boards could refer to settle disputes. Whatever happens, employers and labour will both have to agree to give and take, especially in connection with what Mr. Chamberlain has in view, for these things can only be achieved by the industries of the country producing at a lower cost and in greater quantities. The lower cost would be one means of enlarging our position in the markets of the world and producing a more abundant wealth for distribution.

New Conditions Necessary.

The policies of capital and labour will have to be thrown into the melting-pot, and be changed and refined. The conditions to the higher industrial prosperity will not be realized by, for instance, the policy of shortening output in the mistaken notion that more men will in consequence be employed. Shortening output is not an economy. It raises the cost of production; and, to the

extent that it does so, it places England at a disadvantage—say, with its rival Germany. Increased trade means increased labour. And if increased trade is the objective, Mr. Harry Gosling, the President of the Trade Union Congress, need have no fear that, as order is restored from the existing chaos, there will not be ample work to go round. We agree with him that, so far as is possible, preparation should be made for this now; but the trade unionists must do their part in the preparation, and in making the way smooth for the setting-up of new conditions after the war. There is light shining through the stormy clouds that seem to be invariably overshadowing some part or other of the industrial field. Mr. Gosling said that labour is hoping for something better than mere avoidance of unemployment and strikes. That is good. They "are all tired of war in the industrial field." That is still better. There is hope when men who have preferred a militant policy, and are finding themselves constantly in trouble and still far from their goal, reach such a frame of mind. But it is clear, from what he further said, that the thinkers among the labour unions have not a definite scheme to suggest as to how best to develop new conditions; and the resolutions passed at the conference do not suggest that the trade unionists have risen to the realization that the new-born conditions will require a new policy in respect of trade unionism. A wise initiative will be necessary. Mr. Gosling asked if it would not be possible for employers, at the conclusion of peace, to agree to open up their businesses on an entirely new footing, by admitting the workmen to some participation not in profits, but in control. Why not in both? The leaders fear for the stability of their unions if the men participate in profits without the intervention of the unions. Control suggests capital provision—in other words, that the right to control can only come through participation in the provision of capital. The experience of the gas industry is that provision of capital by labour can only be achieved through the application of the principles of co-partnership; and the South Metropolitan and South Suburban Companies have proved the feasibility of both capital provision and a part in direction under that beneficent scheme.

"Proper Objects for Bombs."

There is indebtedness to Captain Persius for the very frank statement he has made in the "Berliner Tageblatt." He has been an advocate of the use of airships for purely destructive purposes, but is obviously disappointed with the small quantity of destruction that has been wrought at a very heavy expenditure. He has shifted his ground, finds consolation in the indirect consequences of Zeppelin raids, and suggests that these indirect consequences are as important as actual damage. He says that the chief use and object of the airship attacks on England consist in damaging the military means and power of "our most dangerous enemy." This being so, in their chief use and object, the attacks have hopelessly failed. The valorous captain states that not only may bombs be thrown on fortified places, warships, and workshops for making shells and ammunition, but they are also intended to destroy places of economic importance. The economic places that are looked upon as proper objects for bombs are railways, docks, wharves, coal and oil depôts, and electricity and gas works. These are accounted as valuable targets; and the list, the captain remarks, could be continued *ad infinitum*. It is useful to have the well-informed captain's views; and we are obliged to him for them. The raids, he says, keep a large number of men, much material, and many guns and aircraft, from participating in the operations on the Continent. The darkness and the subduing of lights, he observes, also cause interruption of traffic and delays, especially on the railways and at the harbours.

The Metric System.

The old question as to the change of the British coinage and weights and measures to the decimal system was before the British Association at the recent meeting. It was introduced in a paper prepared by Sir Richard Burbidge, which was read, and had support rendered to it, by Dr. John Hunter, of the famous firm of Tyneside shipbuilders, and was supported in discussion by certain eminent engineers. This, however, is hardly the time to bring about such a far-reaching reform. It is all very well for highly educated men to see no difficulties in the way; but they are not the only ones who use weights and measures. The industrial work of the country depends on a great army of men and women whose educational days have long since passed, and who are accustomed to carry on their work with current weights and measures. All these workers cannot be turned at once from one system of weights and measures to another, nor have they the time now to devote to displanting the old quantities and replacing them by something new. To attempt anything of the kind just now would lessen the efficiency of the workers, and the country cannot afford this at the present time. The workers' hands are full; and the country is looking forward to taking a larger productive and trading part in the world after the war. One speaker suggested at the meeting that the change to the metric system should be made compulsory five years after the Declaration of Peace. The time of the workers will be, or should be, fully occupied during these years; and there will be no time to devote to educational matters. It was said that the subject must be seriously taken up if Great Britain was to hold her own in competition after the war, seeing that allied and neutral countries would naturally place most of their orders with those who use weights and measures which they themselves customarily employ. We do not think the old weights and measures would form barriers to trading by other countries if they can get from us what they require, and on the best possible terms. They have not been a bar in the past, and will not be in the future. The change would not much benefit the gas industry, save in engineering work and in the laboratory, in which the metric system is already largely applied. It would, however, be a terrible upheaval to have to change our meter registration and prepayment mechanism, and get people to understand what are the equivalents of the measures and standard prices and dividends specified in the industry's numerous Acts of Parliament. The country is too busy now for this reform; and we must wait for a period of greater leisure.

The Useful Middleman.

There has probably never been an Act put upon the Statute Book that made less attempt at preventing evasion than the Price of Coal (Limitation) Act. The coalowners have shown their old acuity in ascertaining the weaknesses of this protective measure for large coal consumers; and those who have desired to make more money than a strict compliance with the terms of the Act enabled them to do legitimately have found the courses for doing so easy and safe, as they held the whip hand. They can refuse contracts, shift the date of contract making, sell in the open market, part with their coal to middlemen at substantial prices, and the middlemen (who had no contracts in 1913-14 with now would-be customers) have no basis price to go upon, so that those who want to buy what belongs to them must pay the price or go without. There has been a tremendous lot of shuffling-out of the Act; the cases of compliance with the Act look diminutive in comparison. We reported in the "JOURNAL" some time ago—and a Presidential Address recently reminded us of the matter—that the Glasgow Corporation had had a lugubrious experience in inviting offers of coal for the Gas and Electricity Departments. Quite recently at the Corporation meeting, a member of the Electricity Committee stated that, as supplies for the department could not be obtained from coal owners, the Committee had had to make purchases from middlemen, whose charges were above the rates fixed by the Act. It had, he said, been discovered that middlemen were exempt from the Act [this depends on circumstances]; and "an agreement had been come to between owners and merchants whereby a portion of the Corporation supplies had come through the latter." When there are ways and means of getting more than the 4s. standard price above contract prices in 1913-14, then there is no occasion to court a refusal to an application to the Board of Trade for an increase of the standard.

Coal and Coke Exports.

In the second editorial article in the "JOURNAL" for Aug. 22, comment was made on the second war year's experiences in regard to coal exports; and now there are before us the returns for the first month—August—of the third war year. The quantity of coal exported was 3,419,619 tons. We have to go back to 1913 to find the last August that was free from the abnormalities of war. Then the exports amounted to 5,819,162 tons; so that last month there was a reduction upon this figure of 2,399,543 tons. The coal exports in August, 1914, amounted to 3,070,742 tons; and in August, 1915, to 3,650,472 tons. The coke exported still shows good figures in comparison with 1914 and 1915. The exports of coke last month total to 138,264 tons, which compares with 68,498 tons in August, 1914, and 89,574 tons in August, 1915.

OBITUARY.

The death has taken place at Hawick of Mr. JOHN BRUCE, a retired Gas Manager, who at different times controlled the undertakings at Lochgilphead, Coupar Angus, Lockerbie, and Moffat.

Mr. JOHN FAGG, who has died at the age of 96 years, at one time took a very active part in Tonbridge local affairs. For a quarter-of-a-century he was Chairman of the Gas Company; while for fifteen years he acted in a similar capacity in connection with the Tonbridge Water-Works Company. He was by profession an architect.

PERSONAL.

The Devizes Gas and Water Committee have decided to recommend the Corporation to appoint Mr. W. J. RENDELL BAKER to the vacancy caused by the resignation of Mr. J. W. Holloway.

The Gas Managership of Doune being vacant, the position was offered by the Town Council to Mr. J. YOUNG, who has, however, now withdrawn his application. He has, it seems, decided to remain in charge of the Kilmaurs Gas-Works.

Private W. A. BATES, of the Army Service Corps, who was Manager of the Carnforth Gas-Works before joining the Colours, has reached home as a convalescent after five weeks in a London hospital, as a result of shrapnel wounds. He is making good progress towards recovery.

On leaving to take up a position with the Nuneaton Gas Company, Mr. A. F. HALL has been presented by the Directors and shareholders of the Elsecar, Wentworth, and Hoyland Gas Company (with whom he has been for 21 years) with a gold watch. The workmen have also given him a suitably inscribed silver-mounted umbrella. Mr. Hall is succeeded as Secretary to the Elsecar Company by Mr. E. J. OVERBURY, of Petersfield.

Company Sergeant-Major A. W. WORBOYS, of the Middlesex Regiment, who at the outbreak of war was employed at the East Greenwich station of the South Metropolitan Gas Company, has been awarded the Distinguished Conduct Medal. On July 1, although cut off from his battalion and his officers, he collected all the men near him, and continued to lead them until wounded. He bombed trenches while the enemy were still resisting, and repulsed two determined bomb attacks. On many previous occasions he had shown the greatest gallantry.

The death has occurred in action in France of Captain BERTRAM BROWN, who, prior to enlisting in the Army, was the Chief Clerk at the West Bromwich Corporation Gas-Works under Mr. W. H. Johns. Captain Brown, who was aged 25, first joined one of the Birmingham City Battalions, and was subsequently granted a Commission in the Rifle Brigade. Information has been received that Private GARRATT, who belonged to a well-known West Bromwich family, and prior to enlisting on the outbreak of war was a pupil at the West Bromwich Gas-Works, is missing. He was in the Warwicks.

Those who attended the June meeting of the Institution of Gas Engineers will remember that among the visitors present was Lieutenant H. L. STRANGE, R.E., the Engineer and General Manager of the Honolulu Gas Company, Limited, who subsequently proceeded to the front. Unfortunately, he has been wounded, though not seriously, and invalided back to this country. Lieutenant JOHN HOLLIDAY, R.E., whose third "casualty" was reported in the "JOURNAL" a few weeks ago, is now out of hospital, and is in the North of England enjoying a few weeks' leave before proceeding again to the front.

On Saturday last, Mr. T. O. PATERSON, who recently retired from the position of Engineer and Manager to the Birkenhead Corporation Gas-Works, being appointed Consulting Engineer, was presented by the gas-works staff with a handsome Chippendale book-case and bureau. The presentation was made by the oldest employee at the works. Alderman J. H. M'Gaul, the Chairman of the Gas Committee, referred in eulogistic terms to the excellent services rendered by Mr. Paterson during the 36 years he had been in the employ of the Corporation. Mr. M'Gaul made a personal present to Mr. Paterson of a silver cigar case.

Alderman A. Ball, the Chairman of the Nottingham Corporation Gas Committee, was, at the meeting of the Council on the 11th inst., the recipient of hearty congratulations upon the distinction won by his son Second-Lieutenant ALBERT BALL, who within about two months has not only secured the D.S.O., but also the Military Cross, for his intrepid work as an airman. The young lieutenant's military career (he is only 19) has been altogether of a very remarkable character. He originally joined the Robin Hood (Nottingham) Territorial Battalion, as a private, afterwards receiving his Commission in the regiment. He was appointed an instructor in flying; and since he has been at the front he has accomplished a series of notable feats.

Phillips's "A. B. C." Guide to Patents.—The second edition of this work (first issued in the early part of 1913) met with such success as to induce the authors to issue another edition on more popular lines, and by the introduction of a concise statement of the general procedure of protecting inventions by letters patent to make the guide as useful to the inventor who is in his novitiate as to one who has already become a patentee.

ALKALI WORKS CHIEF INSPECTOR'S REPORT.

THE proceedings during the year 1915 are dealt with in the fifty-second annual report of Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, 1906. This, as usual, includes the reports of the various District Inspectors, and that presented to the Secretary for Scotland.

In the year dealt with, the number of registered works in England, Ireland, and Wales was 1372, in 63 of which salt was decomposed with evolution of muriatic acid, defined in the Act as "alkali works." In the others, operations were carried on which called for registration under section 8, or in accordance with the first schedule of the Act. When compared with the year 1914, there was a decrease of five in the number registered as alkali works, and an increase of 21 in those otherwise registered, the net increase being therefore sixteen. There were also 170 works in Scotland registered under the Act—making in all 1542 for the United Kingdom. The number of separate processes of manufacture under inspection last year was 2125, which compares with 2044 and 1997 in the two preceding years. It is pointed out in the report that these figures show an increase of 81 processes under inspection as compared with 1914, and an increase of 128 compared with 1913; and the increase is the result of various changes. Some processes formerly under inspection were discontinued; while others came under inspection for the first time. The increase is associated largely with the manufacture of chemicals used in the production of munitions of war, and with the distillation of tar. There was an increase of four in the number of sulphate and muriate of ammonia works, and of 43 in the number of tar-works. The number of visits to works last year was 5484, and of tests made 5030. In addition to these, numerous visits and inquiries were again made in connection with works which were found not to come within the scope of the Act, in connection with complaints received regarding alleged annoyance or injury from noxious gases escaping from registered works, and in connection with the disposal of acid or other drainage provided for under section 3.

It appears that no proceedings were entered into for the recovery of penalties for contravention of provisions of the Act through undue escape of noxious or offensive gases or for failure to use the best practicable means for prevention of their escape. There were, however, three cases in which less forbearance would in normal times have been shown to the lack of compliance with the requirements of the Act, though Mr. Curphey generously adds that under ordinary conditions it is most improbable that any lack of compliance would have occurred. There were also two instances in which registrable operations were found being carried on in unregistered works; and here, again, after full consideration, it was thought sufficient to accept back fees, in lieu of taking proceedings to enforce the penalties incurred.

Under the heading of sulphate and muriate of ammonia and gas liquor works, there is (at 686) an increase of six over 1914 in the number of processes under inspection—due to new registrations in gas-works and coke-oven works. Expressed in terms of sulphate, the amount of ammonia recovered in the United Kingdom was 426,267 tons in 1915, 426,412 tons in 1914, 432,618 tons in 1913. It was stated that the production and use of ammonia products was largely influenced by war conditions. Last year, as compared with 1914, there were decreases under the headings of gas-works, iron-works, shale-works, and producer-gas and carbonizing works (bone and coal). But the additional output from coke-oven works was sufficiently large to practically make up for the shrinkage in all the others; so that in the aggregate there was a difference of only 145 tons in 1915 and 1914. The following are the full figures which, through the courtesy of manufacturers, Mr. Curphey is able to give showing the quantity of ammonia recovered in the United Kingdom as a bye-product in the various industries named.

Amount of Ammonia Recovered in the United Kingdom (expressed in Terms of Sulphate).

—	1915.	1914	1913.
	Tons.	Tons.	Tons.
Gas-works	173,675	175,930	182,180
Iron-works	15,142	16,008	19,956
Shale-works	58,826	62,749	63,061
Coke-oven works	145,406	137,430	133,816
Producer-gas and carbonizing works (bone and coal)	33,218	34,295	33,605
Total	426,267	426,412	432,618

As the report only came to hand just before this issue of the "JOURNAL" had to be made up for press, fuller notice of the general statistics contained in it are unavoidably held over until next week. The same remark unfortunately applies to a very important and lengthy statement by Mr. Curphey with regard to the direct process for the manufacture of sulphate of ammonia in gas-works, and an inquiry undertaken to ascertain whether data could be obtained which would indicate the directions in which improvement might be looked for, both with respect to more regular working of the purifiers and higher yield of sulphate.

Consideration of the facts which he sets forth led him to the

conclusion that great and avoidable loss of ammonia is taking place at most of the works where the direct process has been introduced. While admitting that further experience is needed before the directions in which improvement is to be looked for can be indicated with certainty, he says managers will be well advised to ensure that purifier temperature is not lowered by undue exposure of the boxes, that the moisture-content of the oxide is carefully regulated, and that the crude gas enters the purifiers cool and dry and with a moderate and regulated amount of ammonia. The use of a washer fed with virgin liquor, placed between the acid bubbler and the purifiers to cool the gases and equalize the supply of ammonia to the purifiers, has, he adds, much to recommend it. Other suggestions made include covering the surface of liquor in all storage wells and supply tanks with a layer—say, ¼ inch thick—of crude mineral oil, and the conveyance of liquor to the well by closed pipes sealed in the liquor. Further, he says that, in the case of larger works, the removal of hydrocyanic acid by scrubbing prior to the passage of the crude gas through the acid bubbler is worth considering. The importance of the regulation of purifier temperature, Mr. Curphey points out, has long been recognized in gas-works practice. The low working temperature of purifiers might be in part corrected by the introduction of a steam-pipe for use in the colder weather; but it is remarked that steam-pipes should be cautiously used. Managers are warned, too, that the moisture-content of oxide should not be rashly reduced, and that experience is needed in this process in the use of drier oxides.

ELECTRICITY SUPPLY MEMORANDA.

WHILE some electrical people have given up all hope of satisfying householders with the sluggish rate of heating water by electricity and with the cost of the operation, when other methods of heating can do the work quicker, supply much larger quantities of water in bulk in a given time, and do this more economically in regard to cost, other electrical men are still muddling about with apparatus which they cannot hope will do anything more than enlist the sympathy of a few friends and capture that minority of vacillating folk who have an inordinate craving for novelty. But all people who study economical operation (which includes time-saving in relation to output) will have nothing whatever to do with water heating by electricity—either in industrial establishments or in the household. Electricians would much like to see an extensive adoption of water heating by electricity, seeing that it would undoubtedly strengthen the position of electric cooking and heating, and at the same time improve the load factor, and so reduce generating costs. But, of course, people generally are not going to be inconvenienced and put to large extra cost for the benevolent purpose of helping the electricity station to gain a reputation for rather better economy than it has hitherto enjoyed. What the customers want is to have the electricity station contributing to their economy—economy both in operating cost and time. This the electricity station cannot do without putting upon itself an undesirable load, as is well shown in an article that has appeared in the "Electrician" by Mr. C. W. Crosbie.

Electricity for Water Heating.

Mr. Crosbie points out that the question of water heating is purely one of competition and economics—competition so far as the consumer is concerned as regards price, convenience, and the service of his existing system, and economics from the point of view of electric supply. The author of the article is one of those who holds the view that both propositions can be satisfied by the adoption of a constant load thermal storage system. Electric-boilers do not appeal to him. By them for large quantities of water, the time required to attain the requisite temperature is too long; the maximum demand is heavy; and, in consequence, a bad load factor is given—so prohibiting the supply of electricity on the most favourable terms. Electric-geysers are also dismissed for general bad character. They are designed for the rapid production of hot water; but the drawbacks set against this unaccustomed virtue in the matter of water heating are: It is necessary to instal one at every point at which water is to be used; the loading, being kept down from considerations of the demand upon the mains, does not allow a sufficiently rapid flow of water to fill (say) a bath in a reasonable time; the maximum demand is exceedingly high; and the poorest of load factors conceivable is given. The electrical engineer does not like spurts or surprises in connection with the demands made upon him for current; and it is one of the weaknesses of his position, that he cannot meet the shocks of demand with the same complacency and economy as he can regular long-hour demands. Yet domestic, hotel, and restaurant cooking and water heating requirements have the inconsiderate habit of drawing very deeply upon the fuel agent used at simultaneous hours of the day—no matter whether the fuel agent be coal, gas, or electricity. With gas, erratic demand does not matter, in view of the storage; and over this favourable position of the gas engineer the electrical engineer is constantly breaking the tenth commandment.

Electric Boiler and Geyser Drawbacks.

But as there is little storage worth speaking of at the generating-station, Mr. Crosbie thinks that the storage of heat energy in water on the consumers' premises will be some compensation, and will help the electricity station. By this means the heat energy would trickle along the cables; and the question of dear copper for distribution purposes would not become an abnormal or acute one, as it might do (it is desired that "might" be duly emphasized) if quick water heating were the practice by electricity. But, of course, with thermal storage methods (especially if incorporated in the circulating system), there are heat losses which fall upon the consumer, and the heat losses have some relation to the length of time taken to raise the water in the bulk to a given temperature. Mr. Crosbie says these losses are not high in a properly lagged system; but some of the "properly lagged systems" that we have seen are not very sightly, and the cost of installation increases with the lagging, though, when heat is obtained from a source that is expensive, every B.Th.U. saved is something to set against increased costs. Mr. Crosbie describes the Cooper water-heater with the heating element immersed in the water in an inner tank, which inner tank is fed from a water-jacket, to which heat is transmitted across an annular air space. In this way, the water is supplied to the inner tank at a considerably higher temperature than would have been the case had cold water been connected directly thereto. The heater is rated at 750 watts, and is said to be capable of heating daily 100 gallons of water from 60° to 110° Fahr. When left on circuit continuously, it has a load factor of 100 per cent., and an efficiency of 80 to 87 per cent. Why Mr. Crosbie starts from 60° Fahr. is not apparent, seeing this is not a fair average temperature to take for water starting cold. It assumes that the water has only to be raised 50° to reach the figure of 110°. The theoretical quantity of heat required to raise 100 gallons 50° would be 50,000 B.Th.U. The heater is rated at 750 watts; and therefore, we may take it the use of 18 units, or 61,560 B.Th.U., on Mr. Crosbie's figures are required per day. Without reducing the price of gas *below lighting rates*, the same amount of work can be done by 4d. of gas at 2s. 6d. per 1000 cubic feet with good types of gas water-heaters, and without spreading the heating of the 100 gallons over the 24 hours. At very short intervals, four baths of 25 gallons each can be had, with the consumption (say) of 125 cubic feet at 2s. 6d., and not at a charge about 1·16th or 1·20th that for lighting. The Ferranti water-heater is a cylindrical storage tank, similar to those used with kitchen ranges; a pipe connection being made at the bottom of the tank, carried up, and reinserted at the top. The circulating-pipe connection carries the heater, consisting of a cast-iron tube with heating elements clamped thereto. The whole apparatus is thoroughly lagged so as to prevent loss by radiation; and this is essential. The rating is 350, 500, or 750 watts on continuous load, according to the size and requirements of the household. The maximum demand is low, the efficiency (says Mr. Crosbie) is about 85 per cent., and the load factor 100 per cent. The "Therol" and the "Losles" heaters are also described; the efficiency claimed for the latter being about the same as in the other cases—87 to 90 per cent. in this instance.

Thermal Storage the Way of Salvation.

The article is a long one; and the next point is very interesting. Mr. Crosbie considers that erroneous ideas prevail as to the quantity of hot water required; and it is generally found that no consideration has been given to the temperature at which the water is to be used. From actual experience, he says, it has been found that an allowance of 7½ gallons at an average temperature of 110° Fahr. per person per day is ample for families of four persons and under; and for a larger number of persons an allowance of only 5 gallons would probably meet all requirements. But we see from a table he gives that the actual total quantity of hot water used in a household per day in which actual measurements were taken was 49·66 gallons, at temperatures varying from 85° up to 132°. Converting the figures to 110° Fahr., the equivalent quantity would be 40·88 gallons; and reckoning an efficiency of 100 per cent. (which is an amusing thing to do), the use of electricity would work out to 7·195 units. But we see that this average only allows for one bath of 20 gallons at 95° (equivalent at 110° to 16·15 gallons). Upon these figures, Mr. Crosbie is of opinion that the thermal storage system is the only one which can be considered on a large scale, and current would have to be offered at ½d. per unit—he thinks with excellent financial advantage to electricity undertakings. But what about the poor consumer who, if he wants several gallons of hot water at a high temperature, has to make his arrangements accordingly several hours before; otherwise he can only expect to obtain really hot water in little quantities (driblets some people would call them) throughout the day.

The Daily Requirements.

As already mentioned, in order to minimize thermal losses by radiation, it is necessary, with such a heating agent as electricity, to thickly lag the storage cylinders, as well as the pipes constituting a circulating system. Some interesting particulars on the subject are given in a brief description in the "Electrical Times" on an equipment that has been made upon a ship for the officers' bath-rooms. The ship's electric light plant supplies the current to two immersion heaters,

Lagging and Heat Saving.

which have a combined loading of 4 KW., each being wired independently for three-heat regulation—the ratings being 500, 1000, and 2000 watts. The cylinder has an approximate capacity of 25 gallons. The article shows that tests have been made with the heaters, and an overall efficiency of 97 per cent. was realized. The cylinder is completely lagged [mark this!] with no less than 2 inches of insulating material, which is surrounded by a special covering to prevent damage. If this will not preserve the heat, then the position of electricity as a water-heating agent would be worse than hopeless; and it is in this conjunction that some interesting data are supplied. During one of the tests, current was switched off at 8 p.m., when the temperature of the water in the cylinder stood at 160° Fahr. At 8 o'clock the following morning, the temperature had dropped only to 122° Fahr. A fall of only 38° in twelve hours, with no current used, speaks well for the efficiency of the lagging employed! But, of course, this is altogether different from a circulating system in a household, with its run of pipes, and withdrawals of water at many points. The bath-room equipment on a ship is very compact. But a ship's installation will not benefit electricity supply undertakings. What a beautiful ornamentation in a dwelling-house, a lagging of 2 inches, with a covering to prevent damage, would be over the whole of the hot-water circulating-pipes.

Some Information Wanted from Mr. Holmes.

We invite Mr. H. H. Holmes, the Sales Manager to the Marylebone Electric Supply Department, to give us certain information, and for the makers of gas-circulating systems to follow up this gentleman in respect of the matter. In a letter to the "Electrical Times," he refers to the article on the subject of the supply of hot water to baths on board ship; and he makes a statement which our own experience enables us to characterize as untrue. He says: "The possibility of the wide adoption of electric water heating has often been scoffed at; but when it is remembered that, with even *the best* gas-circulating system, *often* as much as 80 to 90 per cent. of the heat generated *does not appear in the form of hot water in the bath*, one needs to look a little further before electric hot water apparatus is condemned. Speaking generally, there are few gas-circulating systems in use to-day which a properly arranged electric system could not beat on cost at existing tariffs for current." Will Mr. Holmes give us some addresses where specimens of the alleged widespread inefficiency of gas-circulating systems are to be seen? He ought to have no trouble in obliging us, as his assertion is that "*often* as much as 80 to 90 per cent. of the heat," &c. And he uses the word "few" when referring to the gas-circulating systems that are capable of beating a properly arranged electric system. So that the majority of gas-circulating systems, according to Mr. Holmes, are highly inefficient, and only a small minority are efficient. A gas-circulating system that loses as much as 80 to 90 per cent. of the heat generated is certainly not one of the best; it must be an example of one of the worst. If truth resides in Mr. Holmes's statement, the excellent progress made by water heating by means of gas shows that the public are very willing to pay for an extraordinary waste in order to get the convenience of quick heating by means of gas. Saying this brings us up-against the question as to why fifteen to twenty minutes suffice, starting cold, to get a hot bath of 25 gallons from a gas-circulating system. If 80 or 90 per cent. of the heat is wasted, how comes it that in a short time the water is steaming in the bath, and that in less time than the first delivery a second bath of 25 gallons can be obtained, and so on? We have just been staying at a house having two bath rooms, and hot water is provided by a gas circulator. The servants were not about before seven o'clock; and the boiler burner was then lit up. During our stay, one of the baths was in use at 7.30, and hot water delivered at the dozen or so bed rooms in use; at 7.45 both baths were in use; and throughout the day hot water (the boiler being under thermostatic control) could be had at all drawing points. This household would be much upset under any electric system of supplying hot water.

A Tank at Every Point.

Marylebone has tried several hot water supply systems electrically fed. Many in their time have been praised from that quarter, and apparently one by one they have been discarded. Mr. Holmes now explains the latest system to be adopted. We give the description in his own words, and let it stand, for other systems have been glorified in much the same way: "It might interest you to know that we have developed a considerable business in this district with hot water supplies, and I should imagine have tried every conceivable apparatus and system. The system which we have now standardized is that which provides a separate tank for every hot water point. The apparatus is thermostatically controlled, and is thus entirely automatic. (At points where the demand is very intermittent—such as bath points—the thermostat switches *off* only). Installations arranged on this system have given absolute satisfaction. They have proved very economical, and the upkeep is practically *nil*—in fact, there seems no possible doubt that electric hot-water installations will become quite as common as electric cooking installations, and, so far as reliability goes, not even the electric-motor can show better results." "As common as electric cooking installations!" Mr. Holmes must surely have had "his tongue in his cheek" when he wrote that. There must be a good deal of heat lost from the small separate tanks, unless the lagging of each one takes up nearly as much room as the tank itself. Separate tanks at every point of use must also largely increase the cost of installation.

GAS FROM HARD WOOD AND HEAVY OIL.

A Promising Process at Bahia Blanca.

THE Bahia Blanca Gas Company, in common no doubt with all gas companies situated abroad, have suffered very seriously from the abnormal conditions brought about by the war. A long and very formidable period of drought, followed by the financial setback in Argentina, has made the lot of the working staff an unenviable one. The recent prohibition of coal exports from England, and the freight alone of £4 5s. per ton from the United States, brought matters to a climax, and made it impracticable to continue making gas from coal.

In order to maintain the supply of gas as long as possible, extensive trials were made by Mr. A. M. Hunter (the Engineer and Manager, who has been with the Company since its inception some eight years ago), as to the value of native hard woods alone for gas making; and an excellent yield of gas was finally obtained from one particular quality. But the calorific value of the gas produced was too low to depend upon this entirely. The sale of gas for gas-engines, high-pressure lighting, and heating and cooking purposes brought in a considerable revenue to the Company, and so it became vital to find some means of improving the calorific value.

As no carburetted water-gas plant was available, and time did not permit of waiting for any new plant, Mr. Hunter turned his attention to the possibilities contained in a crude heavy native petroleum raised by the Argentine Government from the oil-fields in Patagonia, and carried out a series of experiments in the ordinary coal retorts with various methods of using this oil. Eventually, he evolved a process which gave consistent and favourable results. This crude oil is of an asphaltic character, similar to the Californian and Texas heavy oils, and therefore not exactly a promising substance for the purpose in view. As the process is probably quite original, it may interest readers of the "JOURNAL" to have a few preliminary particulars regarding it. The native hard wood, cut to suitable lengths, is charged into the ordinary ⊃ retorts, which are maintained at a high temperature. The carbonization period is four hours, during the first hour of which gas, of about 7 candles and 397 B.Th.U., comes off violently, and then rapidly diminishes. After the first hour, and when the wood has reached the incandescent stage, the crude heavy oil is introduced into the retort, under a pressure of 80 lbs. to the square inch, through injectors specially designed by Mr. Hunter. This completely atomizes the oil. The resultant gas throughout the carbonization period may average as high as 575 B.Th.U. per cubic foot; and an average yield from approximately 8 tons of hard wood and 1·2 tons of heavy oil is about 137,700 cubic feet, of 528 B.Th.U. gas. One would like to know whether this idea has previously been tried anywhere.

Mr. Hunter reports that the gas produced is giving entire satisfaction on the district; and he believes the process is capable of improvement. More definite results will come forward in due course. Preliminary tests have shown the gas to be permanent, and the wood-gas content capable of picking up and carrying forward the richer hydrocarbon gases evolved from the oil, possibly upon the lines so fully investigated in years gone by by the late Mr. William Young, of Peebles.

Gas made entirely from heavy oil, as practised to so large an extent in the Western States of North America, is fully known to Mr. Hunter; but conditions do not at the moment permit of considering this system.

Gas Chemists' Summary 1915.—There has, unfortunately, been some unavoidable delay, through shortage of labour, &c., in the publication of the 1915 edition of Mr. A. V. Hendrickson's "Gas Chemists' Summary." The book, which has been prepared in the same form as last year, is, however, now ready, and is published at the "JOURNAL" Offices, price 3s. 6d.

National Insurance (Part II.) (Munition Workers) Act, 1916.—The Umpire has decided that contributions are payable in respect of workmen employed in the manufacture or repair of gas-meters, including painting, testing, examining, packing, and leather sewing. Contributions are not payable in respect of workmen employed at fire-clay mines, including clay-getters, banksmen, and haulagemen taking the clay to the tipping-mound. They are also not payable in respect of workmen engaged in the repair of gas-holders which are built up on the site.

Eastern Counties Gas Managers' Association.—The Hon. Secretary (Mr. F. M. Paternoster) announces that it has been decided not to hold an autumn meeting of the Association this year, but to adopt the same course as was followed in 1915. In order that the routine business of the Association may be carried on, a meeting of members will be held at the Liverpool Street Hotel (Lincolnshire Room), Bishopsgate Street, on Thursday, the 28th inst., at 2.30. No address will be given or papers read. The only business to be transacted will be the induction of the incoming President and officers, to receive and pass applications for membership, and such other matters as may be brought forward.

THE GAS CHEMISTS' SUMMARY, 1915.

Reviewed by J. T. Sheard, F.C.S.

THE annual review of, and index to, current gas literature by Mr. Hendrickson, continues its career of usefulness. In interest and importance the present volume does not fall short of either of its predecessors. Notwithstanding that, owing to the exigencies of the time, the principal professional societies have not furnished their usual quota of important papers on technical subjects, quite an extensive and varied crop of valuable information has been gleaned from the different journals and periodicals consulted. There are indeed, nearly double the number of pages in this volume that were contained in the first.

The author, quite properly, follows the practice of allotting more or less space according to the importance or dominating interest of the subject. Thus we find that the recovery and testing of benzol and toluol—a subject which just now looms largely in the gas technician's eye—is treated at considerable length. And, similarly, the report of the Royal Commission on Sewage Treatment is quoted from *in extenso* with reference to the disposal and treatment of spent ammoniacal liquor. Other matters of pressing importance which are given special prominence are naphthalene and tar dehydration. It is perhaps inevitable that, in thus judging of the relative claims to importance and emphasis of contemporary contributions to technical knowledge, some mistakes will be made. The "JOURNAL" files, for example, bear eloquent testimony to the considerable stir made in their day by projects that have now vanished into obscurity.

In addition to the usual subject-matter index, which has been given before, an index of authors' names has been added to the present volume; but the excellent typographical arrangement of the book, and the method of classification of subjects adopted by the author, render a reference to the index less frequently necessary than usual. There are one or two slight inaccuracies (as on pp. 81 and 169, for instance) which might have been avoided by a more careful reading of the proof-sheets; but considering the period of exceptional stress, and the difficult circumstances in which the author has worked, the book is noticeably free from material errors.

PUBLIC LIGHTING CHARGES.

[COMMUNICATED.]

THE very frequent references to public lighting charges which have been appearing in the "JOURNAL" the last few months, and primarily occasioned by the lighting restrictions now imposed throughout the country, must arouse a certain amount of interest as to what effect it will all produce on the minds and actions of local authorities, when normal times return.

It may be argued that present arrangements in nowise stand as precedents, because of the abnormal conditions. But local authorities have a nasty habit of searching the country for precedents; and it must be confessed that some rather unusual—and in one case startling—terms have been actually embodied in Acts of Parliament quite recently, as evidenced by the review editorial in the issue of the 12th inst., on "Financial Changes in Gas Legislation," and by a previous review of the Bills wherein the details are fully set forth.

Turning to p. 522 of the issue of the 12th inst., the extraordinary claim is made by the Whitchurch (Salop) Urban District Council, that they have found *they are legally entitled to the concession*. Unless a price is specifically embodied in an Act or Provisional Order for gas supplied for public lighting, the whole matter is governed by clauses 24, 25, 26, and 27 of the Gas-Works Clauses Act, 1871; and in no single instance is it stated that gas supplied for public lighting shall be otherwise charged for than by agreement, or, if necessary, by arbitration under the Companies Clauses Consolidation Act, 1845.

Clause 24 is quite definite on the procedure as follows:

> . . . and the price to be charged by the undertakers and to be paid to them for all gas so supplied shall be settled by agreement between the undertakers and local authorities, and in case of difference by arbitration—*regard being had to the circumstances of the case, and the prices charged to private consumers in the district.*

Nothing here legally entitles them to a *concession*; it merely prevents them being charged more than the private consumers in the district for similar purposes—*i.e.*, lighting.

Incidentally, the last sentence debars the local authority from raking all over the country for comparisons.

Now we come to the practical point at issue: What is a fair charge for gas for public lighting purposes, having regard to "the circumstances of the case, and the prices charged to private consumers in the district?"

Like "&c.," we may at once grant that "the circumstances of the case" covers a lot—one is almost inclined to say—of sins, and in recent legislation may have been the governing factor from the undertakers' point of view. But, "in regard to prices charged to private consumers," how does the case stand?

Where gas is sold on a quantity basis, obviously the solution is quite simple; but where gas is sold on a differential basis for lighting, cooking, heating, power, or industrial purposes, the solution is one which most undertakers would shrink from submitting to a layman. Will someone set forth the claims usually allowed as influencing the price of gas to the public lamps?

As a contra account, the writer submits the following arguments against special concessions:

(1) They are a peak-load customer, and therefore do not come within the catagory of either cooking, heating, power, or industrial, which tend to level the day load.

(2) Each lamp entails a separate service-pipe, considerably increasing distribution costs and the risk of leakage. Arising therefrom, the annual consumption per service is low in comparison with the private consumers. These are the writer's figures for the year ending 1915:

Average Sales.

Per ordinary meter	28,951	cubic feet	per annum.
,, slot ,, ...	10,108	,,	,, ,,
,, public lamp	7,325	,,	,, ,,

(3) Large variations in the consumption of metered lamps of similar category, requiring an amount of sweet reasonableness in adjustment, sometimes against, and sometimes in favour of, the undertakers.

No doubt it is a delicate question; but that is no reason why it should not be ventilated and some sort of a working basis agreed upon against the return of normal lighting conditions.

STANDARD OF CALORIFIC POWER ACT.

The Style of Public Announcement Required.

To give readers an idea of the simplicity of the procedure necessary when making application for an Order under the above-named Act, the newspaper notice published in the case of the Brighton and Hove Gas Company may be reproduced.

Board of Trade, 1916.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

SUBSTITUTION UNDER THE GAS (STANDARD OF CALORIFIC POWER) ACT, 1916, OF STANDARD OF CALORIFIC POWER FOR STANDARD OF ILLUMINATING POWER OF GAS SUPPLIED BY THE COMPANY.

Notice is hereby given that the Brighton and Hove General Gas Company (hereinafter called the "Company") intend to apply to the Board of Trade, under section 1 of the "Gas (Standard of Calorific Power) Act, 1916," for an Order under that Act for all or some of the following purposes, that is to say:

To substitute for the standard of illuminating power prescribed by the Brighton and Hove Gas Acts, 1839 to 1915, a standard of calorific power of 500 British thermal units (gross).

To substitute for the provisions of those Acts as to testing for the illuminating power of such gas provisions for testing the calorific value thereof, including provision as to the apparatus to be used for such testing, to exempt the Company from penalties in respect of deficiency in illuminating power, and to substitute for the provisions imposing such penalties provisions imposing penalties in the case of deficiency in calorific value, and to make such other ancillary or incidental provisions (if any) as may be deemed expedient with respect to the matters aforesaid, including any variation of the pressure prescribed by the said Acts for the supply of the gas supplied by the Company thereunder.

Any objections or representations with regard to the intended application may be made by letter addressed to the "Assistant Secretary, Board of Trade (Gas and Water), No. 7, Whitehall Gardens, London, S.W.," on or before the 28th day of September instant. A copy of such objections or representations must also be sent at the same time to the undersigned; and in forwarding the objections or representations to the Board of Trade it should be stated that this has been done.

Dated this 13th day of September, 1916.

(Signed) SHERWOOD AND CO., &c.

CANADIAN GAS ASSOCIATION MEETING.

THE Ninth Annual Meeting of the Association, which was held in Quebec, from Aug. 16 to 18, under the presidency of Mr. R. A. Wallace, was attended by about 150 members and friends. They were welcomed by the Mayor of Quebec (Hon. H. E. Laviguer), and thereafter considered reports submitted—including that of the Secretary and Treasurer (Mr. G. W. Allen, of the Toronto Gas Consumers' Company), which showed the Association to be in a flourishing condition. Mr. J. P. King, the Manager of the Stratford (Ontario) Gas Company, was elected President for the ensuing year.

The following papers were read during the meeting: "Gas Lighting," by Mr. J. B. Conroy, of the General Gas Light Company, New York City. "Is the Industrial Fuel Business Worth While?" by Mr. H. E. G. Watson, the Industrial Fuel Expert of the Consumers' Gas Company of Toronto. "A Comparison of Modern Coal Carbonization Plants," by Mr. Vernon Baker, the Engineer to the Russell Engineering Company of St. Louis. "The Relationship between the Accounting and Operating Departments," by Mr. H. K. Tennent, Accountant to the Quebec Railway, Light, and Power Company. "What is a Gas-Meter?" by Mr. J. B. M'Nary, Manager of the Canadian Meter Company. The last paper was by Mr. P. B. Lamb, of the Ottawa Gas Company, entitled "Some Wrinkles on Distribution."

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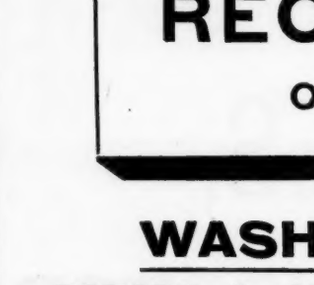

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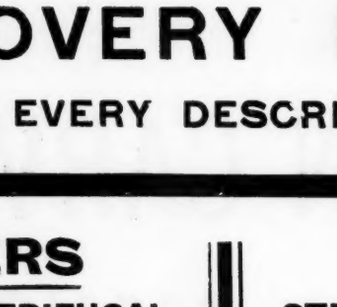

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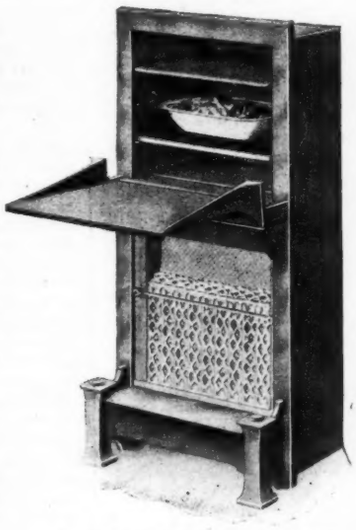
THE RICHMOND ALLIED GAS COOKER AND FIRE.

With a Few Notes on the "R.H.D." Fire.

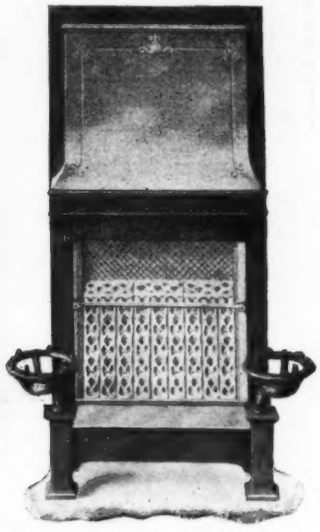
This is an age not only of competition in goods, but of brains. Cute manufacturers ever have their eyes open with watchfulness in order to detect any new promising demand in their lines of production; and, when detected, brains are at once set to work to devise what is required. Under the circumstances of close observation, quick discernment, and an agile capacity for designing and manufacturing, it is not astonishing that different firms should occasionally synchronize in new productions.

During recent years, there has been a considerable change in housing requirements. Flats, for example, have, for various reasons, become much patronized. If habitations of the kind are not always so roomy and airy as houses, they have certain conveniences which with many people weigh in the forming of preference. There is less work in them; and they allow more liberty in that they can be (as they frequently are) locked up and left with greater safety than a house. Then there is the bungalow, which is growing largely in favour. Many people, too, reside in apartments—chiefly on grounds of economy; and there is a dense working-class population living in houses with very small kitchens, and, in a considerable number of instances, with only two or three in the family. From these small households a demand has arisen for moderate cooking accommodation allied with a gas-fire, in view of the fact that there is not the space to spare for the ordinary gas-cooker in addition to a gas or coal fire.

The illustrations show a combined cooker and heater which the Richmond Gas Stove and Meter Company, Limited, have designed to meet a growing demand. Despite the range of service incorporated in the combination, it takes up little more room than the average size gas-fire; and seeing that cooking, grilling, baking, and boiling, as well as room heating, can be carried out by the one appliance, the slightly increased cost has ample compensation.



Richmond's New Gas-Stove, Showing Ample Oven Accommodation.



Showing Oven Closed and Method of Fixing Boiling Burners.

In the example illustrated, Richmond's standard 12-inch fire front is used, with silent burner. The oven is of sufficient capacity to be really serviceable, and even a good-sized joint would not be beyond its power. The boiling-burners are of adequate size, and sufficiently powerful to speedily boil water for tea or coffee, make soups, stews, &c. The burners are rigid and strong, with rests of ample size to carry pots and kettles of any dimensions likely to be required. The burners can be removed by hand; and, when this is done, and the oven front closed, the stove is indistinguishable from the ordinary gas-fire—indeed, it presents quite a handsome appearance; and there is no doubt that many consumers would, without the cooking attachments, choose it as a gas-fire on account of its symmetrical design. It is primarily intended for use as a "built-in" grate; the flanges on the front making a perfect fit with the iron or tiled sides of the grate. It can, however, quite well be placed in front of the usual coal grate, and is made in standard sizes to suit all requirements.

The "R.H.D." Fire.

Some twelve months ago, the Richmond Company introduced their "R.H.D." [radiant heat distributor] fires; and they immediately created considerable interest in the industry. It was not a development of existing gas-heating stoves, but a step from the conventional, introducing a new principle in construction. Makers had been concerned for some years in endeavouring to secure an increase in the radiant heat emitted from the gas-fire; but the problem of efficiently and uniformly distributing the heat generated had received little, if any, attention. The very success achieved in securing a high percentage of radiant efficiency rendered it imperative that some means should be devised to more equally distribute the heat rays throughout a room. The incandescent surface of the "fuel" of the modern gas-fire had been becoming hotter and hotter as each season went by, and makers added to the radiant heat emitted; but the flat-fronted fire, with its strictly limited sphere of operation for the radiant heat, still continued in vogue. Seated in front of the fire one was beautifully warmed, and, indeed, on too near an approach, scorched, while at the side, out of the range of the heat rays, there was a perceptible drop in the temperature. The makers of the "R.H.D." fire claim, and with justification, that this inequality of heating is abolished in the fire. [It was illustrated in the "Journal" about a year ago—on Aug. 31, 1915, p. 445.] Radiant heat is distributed to every corner of the room, and no part escapes the hygienic warming influence of the well-dispersed rays.

Ventilation.

Coupled with the principle of distributing the radiant heat over a wide area is the principle of ventilation that is embodied in the "R.H.D." fire—*i.e.*, drawing air from a wide area. The contention of the firm is that a single current of air drawn from one position, and passed through a restricted orifice, is akin in principle to the flat-fronted fire giving all its radiant heat to a limited area. The illustration showed the numerous air-ports provided in the "R.H.D." fire, through which air continually streams—thus gently but thoroughly ventilating the apartment.

The fire is fitted with nickel reflectors at each side, on the fender and on the ledge of the canopy; thus preventing the absorption of heat from the radiants by the extreme sides and the canopy of the fire, and deflecting it out into the room.

Silent Burners.

The adjective "silent" as applied to gas-fires has apparently been claimed by the Richmond Company as their prerogative, judging by the continual use, it is noticed, they make of it in their advertising literature. That there is justification for the claim to silent burning is apparent by observation of their fires. Still further research work has since last season been devoted by them to this feature; and burners are now provided that give flame silence over a much greater range of aeration than has been practicable previously. This has been rendered possible by the insertion in the body of the burner of a single grid device, which is easily removable (if desired) for inspection purposes. There is only one grid per burner; and it is so designed that fluff will not collect in it, but will pass through with the gas stream. Broken pieces of radiant falling into the burner cannot drop on to the grid. If only small openings or slits are used, trouble, it is suggested, occurs owing to the collection of fluff. The grid eliminates violent eddies from the stream of mixed gases, and allows the formation of a silent flame, which is not ensured merely by proper mixing of the gas and air, as is generally assumed. The simplicity of maintenance is obvious from an inspection of the burner.

Of course, in these days of national service, and shortage of labour for ordinary industrial work, it is not surprising that the range of new productions in any line is not large. It is sufficient to attempt to keep pace with the demands for the existing best pattern and highest efficiency goods. At the same time, it is gratifying to find that fresh needs are being met, and that productions which have had a run in one or more previous seasons have been improved in accordance with the dictates of experience.

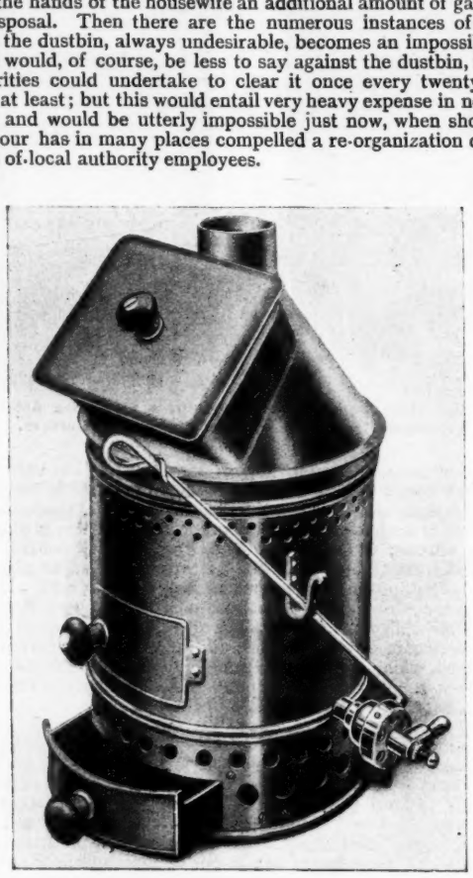
North of England Gas Managers' Association.—The proceedings at the half-yearly meeting of the Association, which will take place on the 7th prox., are to include a paper by Mr. A. B. Walker, of Wallsend-on-Tyne, describing the coke-handling plant at the Howdon Lane Gas-Works, and one by Mr. A. B. Roxburgh, of Newcastle-upon-Tyne. Mr. William Hardie, of North Shields, has been appointed Acting President, in place of the late Mr. Mark Fligg.

American Bye-Product Coking Industry.—The value of bye-products recovered from American coke manufacture in 1915 was nearly £6,000,000—a large increase over the previous high-water mark of £3,500,000 in 1914. Although there were material increases in the output and value of gas, tar, and ammonia, which was to be expected with a greater output of bye-product coke, the increase in benzol products presented the most interesting feature of the year in the coke industry. The value of these products rose from less than £200,000 in 1914 to more than £1,550,000 in 1915. Benzol had been recovered from coke-oven gas for a number of years; but prior to 1915 the market was small and prices were low. The benzol products obtained in 1915 amounted to 16,600,657 gallons. More than 13,000,000 gallons of the total output was reported as crude light oil. Some of the plants have their own stills and refineries; and the pure benzol reported from these sources amounted to 2,516,483 gallons, with an average value of 2s. 4d. (at least three times the value of crude benzol before the war), and 623,506 gallons of toluol, with an average value of 10s. a gallon.

DESTROYING HOUSEHOLD REFUSE BY GAS.

Davis's Domestic "Burn-All."

VARIOUS causes have of recent years combined to make the question of how to dispose of household refuse a general problem of a serious nature. The old-fashioned kitchen range, in addition to being a voracious consumer of expensive coal, would also, when in full operation, burn, though not usefully from a heat generating point of view, many things that it was desirable to get rid of. And for such garbage as could not be disposed of in this way there was the dustbin—which was not then looked at askance to the extent it now is. More and ever more attention has been paid to the subject of domestic hygiene; and the result of this shows itself in many ways—from the method in which the early morning milk is delivered, onwards. To keep to the matter now in mind, in the light of scientific study the dustbin stands condemned; and while the desirability of abolishing it is everywhere recognized, the enormous popularity of the gas-cooker, by doing away with the refuse-burning range, has thrown upon the hands of the housewife an additional amount of garbage for disposal. Then there are the numerous instances of flats, where the dustbin, always undesirable, becomes an impossibility. There would, of course, be less to say against the dustbin, if the authorities could undertake to clear it once every twenty-four hours at least; but this would entail very heavy expense in normal times, and would be utterly impossible just now, when shortage of labour has in many places compelled a re-organization of the duties of local authority employees.



The Davis Domestic "Burn-All" Complete.

All considerations lead to the conclusion that household and garden refuse must be destroyed—and it can be, in the "all-gas" house, as well as elsewhere. True, it cannot be placed in the gas-cooker, as it can in the coal-range; but with so adaptable a medium as gas, nothing of the kind is necessary. A far more efficient method is at hand (and one that can be employed in the most circumscribed kitchen), in the shape of a compact little gas-fired appliance that is introduced by the Davis Gas-Stove Company, Limited. To this they have given the name of "Burn-All"—two words which comprise both an injunction and a claim. As to the injunction, mention has already been made of the desirability from a hygienic point of view of destroying the refuse; while with regard to the claim, actual working trials have, we are assured, demonstrated that the apparatus can successfully deal with any domestic matter, wet or dry, that is capable of being burned. The title can therefore fairly be said to be a happy one.

Viewed in action at the Davis Company's Oxford Street Salons, two thoughts immediately suggested themselves—the first, that the "Burn-All" takes up so little space as hardly to count in a kitchen; and the second, that the arrangement is so simple as to harbour no complication whatever. But it must not be assumed from this remark about simplicity that the designing of the apparatus presented no difficulty. On the contrary, there were various difficulties to be overcome before thoroughly satisfactory results were achieved by the application of working experience and inventive skill. The accompanying illustration shows what the apparatus is like in appearance; but, of course, it gives no idea of its small size. The height over all, including the flue outlet, is but 18¼ inches, and the diameter 10 inches; so that where a coal-range is installed, there is no difficulty whatever in placing the "Burn-All" upon the top of it. In fact, it has really been designed to be so placed, either temporarily or permanently; the flue-outlet projection fitting between the bars of the range plate-rack, if these are not altogether removed. Where the range is subject to intermittent use, the "Burn All" may be installed as a permanent fixture over the oven, without in any way obstructing the working of the stove. All that is then needed is to pierce the register plate in order to pass the flue-pipe into the chimney. The alternative—which is recommended in cases where the use of the coal-range has been abandoned altogether, or for the summer months only—is to place the appliance directly over the range fire opening, when the flue-pipe can be passed through the top register opening, without any piercing being necessary. These alternatives refer only to placing on the coal-range. Other positions, where there is no coal-range, will easily suggest themselves, so that the flue-pipe can be carried into the chimney. There is provision for either right or left hand gas connection; and flexible tubing can be used where the fixing is temporary.

Reverting to the illustration, it may be stated that the apparatus consists of an outer casing and an inner removable lining, both of steel. The aperture for feeding into the combustion chamber will be seen at the top; and beneath it are first a lighting, raking, and inspection door, and then the ash-tray. In the chamber, between the inspection door and the ash-tray, is the perforated combustion plate on which the garbage rests, and under this a ring-burner, with the jets arranged to give suitably varied flame lengths. Needless to say, care has been taken to so arrange the apparatus as to ensure that neither refuse nor the resultant ash can come in contact with the burner; while the ventilation is under all conditions adequate. The gas injector and air regulator, with a poker for "tickling" the garbage occasionally while burning, complete the parts.

It is recommended that the burner should be lighted up about five minutes before the refuse to be burned is emptied into the combustion chamber (to any extent not exceeding two-thirds of its capacity). Besides feeding the chamber until all the refuse is consumed, the only thing that has to be done is to stir the contents from time to time with the poker, and then at the end of the process to empty the ashes from the tray. The operation is thus simplicity itself, as well as the apparatus, which is constructed in a manner to reduce wear and tear to a negligible point. As to performance, the makers say it has been found, by severe practical tests that, by means of the "Burn-All," a pailful of mixed kitchen garbage can be reduced to less ash than will fill the small tray provided—the burning taking less than an hour, and costing, with gas at 3s. per 1000 cubic feet, not more than 1d. The up-draught is sufficient to carry all smoke, fumes, and odours of combustion through the flue and into the chimney; so that no objection to the device can be urged on this score.

There is urgent need for such an appliance as the Davis "Burn-All;" and if in everyday practice all that is claimed for it is actually secured—as to which careful inspection has suggested no reason for doubt—the firm should be amply repaid for the trouble and expense they have incurred in meeting a public want.

THE PROSPECTS OF THE GAS CHEMIST.

By "XENON."

PROGRESS in the application of chemical science to the solution of the numerous problems associated with coal carbonization and gas manufacture has been deplorably slow. This has been partly due to the fact that gas manufacture has always been regarded as essentially a branch of engineering; the chemist being either non-existent on a gas-works, or entirely eclipsed by the engineer. The result has been that much greater progress has been made in the invention of mechanical aids and structural improvements than in the discovery of the many economic secrets which lie concealed in coal and its congeners. Even to this day there is practically no organization of the chemists of the industry, and very little collaboration between the chemists attached to different gas undertakings. A Society of Chemical Industry has been in existence for some thirty-five years. But for the first time in its history a gas man is now at its head; and, although he is a chemist of no mean attainments, he has always been sufficiently worldly wise to eschew the title of chemist.

In the past, most gas directors have regarded a works' chemist as an almost superfluous official, and his appointment has too often been grudgingly allowed only as a concession to the engineer. His education has commonly proceeded in this wise: The manager having a taste, but very little spare time, for experimental work, has selected a "nice lad" of fairly good education and has initiated him into the mysteries of the usual testing operations, and has encouraged him to attend evening classes in chemistry. At this stage he has been called "chemical assistant." For a while all has gone well; but in the course of time the lad has grown into a young man, and demanded more remuneration. To pacify the directors he has then been told to put in part of his time in the drawing office; and his title has been altered to that of "chemist and draughtsman." In a really first-class works he has now been allowed to receive almost as large a remuneration as that of a stoker. In the fullness of time the ambitious chemist and draughtsman has sought still further honours, but has found

that he must now forswear the title of chemist and seek promotion to the office of "assistant engineer." From this position the final step has been promotion to the office of "chief engineer."

In such circumstances it is not surprising that few chemical discoveries of importance have been made on gas-works. The study of gases and of the other products of coal carbonization and oil-splitting is an undertaking sufficiently complex and difficult to engage the whole attention of a man from youth to old age, without the addition of the burdens of the engineer. Unfortunately, some of the eminent scientific men retained in past years to aid the gas industry have made some bad blunders, and have brought chemists into undeserved disrepute among many men of common sense. The memory of the old Referees' test for sulphuretted hydrogen is still a nightmare to many of us. For years eminent men of science prescribed a penalty test for the presence of a harmless trace of sulphuretted hydrogen in coal gas, while permitting the presence of ten thousand times more sulphur in the form of thiophen and bisulphide of carbon. This test was a cause of irritation and much useless expenditure during the many years that it was in vogue; and, naturally, it evoked the scorn and righteous indignation of Sir George Livesey, Mr. H. E. Jones, and other engineers, who keenly felt the folly of it. The penalty clauses for sulphur compounds other than sulphuretted hydrogen also brought premature greyness to many a youthful head. O Science! what wickedness has been committed in thy Name!

Matters are, however, improving, so far as respect for chemists and their work is concerned. The present war has revealed to the general public the fact that coal carbonization is a chemical industry of great national importance. The country has discovered with some astonishment that our Army and Navy would speedily be reduced to hopeless feebleness by a stoppage in the supply of the products of the coal carbonization works. Sulphuric acid, ammonia, benzene, toluene, xylene, phenol, and cresol are all urgently required in unlimited quantities for war purposes; while coke and gas are also playing their part in winning the battle. If gas supply as a public-utility service had, before the outbreak of hostilities, been entirely superseded to any material extent by electricity, history would have but a sorry tale to tell of the British achievements in the war. It is evident that our war authorities must for evermore keep in touch with the work of all business undertakings which carbonize coal; for nearly all the high explosives used in modern warfare are prepared from coal derivatives.

It is, moreover, probable that, apart from their increasing utility to the war authorities, large gas undertakings will gradually become more and more important as producers of chemicals and fuels; for even when peace is restored it is unlikely that those who have found the working-up of their own bye-products more profitable than selling the crude residuals to outside firms of tar distillers and chemical manufacturers, will revert to their pre-war custom. The tendency will be to extend the number of useful commercial commodities manufactured on gas-works, although comparatively few gas undertakings can expect to compete with Beckton in the number of its products. The materials which are no longer required by the Ministry of Munitions will be in demand for the production of dyes and fertilizers. A larger business will probably be done in the manufacture of motor spirit and fuel oils, and even small gas undertakings may turn out dehydrated tar and convert the crude light oils into motor spirit. The manufacture of fuel briquettes from gas-works residuals and slack is another industry requiring a certain amount of chemical supervision, which may be established in the gas-works in certain localities.

The manufacture of aniline dyes will probably, in most cases, continue to be left to some outside firm, such as British Dyes Limited; but the increasing importance of gas-works as chemical factories ought to attract to the industry more men who have had a lengthy training at a scientific university. More progress would then be achieved in manufacturing from coal and oil the commodities of most use to the community, and with the greatest possible economy. But till it is recognized that the chemist must be allowed to continue his activities as a chemist to the end of his business career, instead of having to seek promotion to the office of engineer, the highly-trained chemist will seek employment elsewhere.

Some of our most esteemed engineers and managers of the present time have occupied the position of gas-works chemist in the days of their youth; and these will probably be the first to admit that, although a knowledge of chemistry is useful to a gas engineer, the industry is not likely to make much progress in its chemical branch until as much importance is attached to the training of those lads who are to become gas chemists as to that of those who are to become gas engineers. But since the control of the gas industry is, for the most part, in the hands of engineers, the immediate future of chemistry in gas-works and the pecuniary prospects of the gas chemist are dependent upon the engineers. Since the selection and payment of the chemists is in their hands, they also must be held largely responsible for the failure or success with which chemical science is applied to the needs of the industry in the immediate future.

It is reported that a liquid that resists the action of fire and water, and renders all inflammable materials absolutely fireproof, has been perfected in the pharmaceutical laboratories of the University of Iowa. When wood, cloth, or paper are saturated with the liquid, and then dried, an insoluble mineral material is left in the cells of the fibre, making combustion impossible.

THE READJUSTMENT OF VALUES.

The Gas Industry on a War Footing.

By Thos. Newton.

One of the most remarkable developments now engaging the attention of the civilized world is the readjustment of values that is seen on every hand. No sooner had the tocsin of war sounded than men and things began to assume new values according to their respective national importance. Almost as if by magic, industries, and the persons engaged in them, automatically began to fit themselves into the mosaic scheme of national resolve; and both were valued in proportion to their national effectiveness. Some hitherto apparently important industries were found in the stress of war to be of no national importance whatever; others were found to be more or less insignificant. Hence, the energies of those engaged in them were promptly diverted into other more important directions. Values as regards occupations were thus transposed; and the suddenness of the transposition was indeed startling. Most business men had long grown accustomed to the vagaries of the law of supply and demand in the usual routine of business; but even they were more or less surprised when the law started operating upon a gigantic scale. The effect of all this has undoubtedly been very illuminating and educative.

Indispensability of the Gas Industry.

Happily, the gas industry, which in times of peace had largely and materially contributed in different directions to both municipal and national development, proved in time of war to be absolutely indispensable. Admittedly an industry of very great national importance during the normal times of peace, it became pre-eminently important during the stirring time of war. The gas industry on a war footing has played, and is playing, a worthy part. It is now almost a common-place to remark how the use of gas was considerably extended and pressed into service for innumerable operations connected with the actual manufacture of munitions, and how it administered to the comfort of those engaged in this most necessary work.

From the time when the much-debated question concerning the use of high explosives was definitely settled in a very practical manner on the battlefields of Flanders, the gas industry at once stepped into the breach, and thus saved the situation. Certainly the industry prevented the lack of high explosives being a fatal bar to our military success when once the need of them became fully appreciated. This naturally involved the application of much original thought, and the sinking of a considerable amount of capital—primarily from purely patriotic motives; and the country is to be congratulated on the enterprise and skill which brought the increased production of the constituents of high explosives to such a successful issue.

Obtaining Uninterrupted Supplies of Coal.

Incidentally, it may be remarked that an industry which had amply justified its existence in times of peace, and which has more than justified its existence in time of war, is worthy of greater consideration as regards the provision of facilities for obtaining the raw material than has hitherto been accorded it; for it should be remembered that this forms the basis from which the constituents of the required high explosives must be obtained. The absence of facilities for obtaining uninterrupted supplies of coal at reasonable—not treasonable—rates amounts to a positive scandal which no self-respecting Government should for even a moment tolerate. So important is this particular question considered to be in Germany, that the Prussian War Office and Ministry of Commerce have instructed the collieries to give gas-works a preference over all industries [see "Journal," *ante*, p. 340]. The reasons for this are fairly obvious.

Extended Use of Gas a Patriotic Duty.

Since it is essential that the Government should be assisted, at all costs, to obtain increased supplies of the constituents of high explosives, it is also essential that the use of gas should be further encouraged and extended to enable this to be brought about. This patriotic duty will be the more agreeably performed when it is pointed out to consumers that they also will be studying their own interests by using gas for all conceivable purposes. Thus, by developing the use of gas, both producer and consumer alike will actively and materially assist in the direct prosecution of the war. Rightly considered, this is a fact of some importance, which should not be lost sight of. Many industries would readily advertise it; and it might, with advantage to all concerned, be more widely circulated.

A Combination of Circumstances that might be turned to Good Account.

A combination of circumstances has already developed the seriousness of unduly inflated coal prices affecting the whole community; and this is a matter of some concern to most gas-works. Although, admittedly, these inflated coal prices constitute a great drawback to the gas industry (since coal is the industry's raw material), it should be borne in mind that, while these inflated prices last, they may be legitimately used and turned to account as an argument in favour of the more extended use of gas. If, in pre-war times, gas could successfully compete with coal for

cooking, heating, and a thousand-and-one other things (which is indisputable), it is obviously much better circumstanced in the competition of to-day, when it is considered that the relative increases in the prices of coal and gas are overwhelmingly in favour of gas. Much better value for money is offered in gas to-day than in coal, as compared with pre-war prices; and this fact should be emphasized in all our dealings with the public.

The triumph of the gas-cooker is complete. Notwithstanding the uninformed criticism sometimes levelled against it, this piece of apparatus is surprisingly efficient under all practical conditions. Even the so-called improvements relating to gas-cookers, which are lavishly advertised to yield such a phenomenal saving, are mostly efforts in the direction of further adapting gas as a fuel for cooking purposes, rather than in the direction of supplanting gas by some other fuel. Whether there is any justification for the absurd claims made on behalf of these phenomenal gas-saving appliances, is, as Kipling would say, another story. It is sufficient for present purposes to remark that gas for cooking still holds the field against all comers. Nor is it likely to be ousted by any known rival.

Similarly, the growing popularity of gas-fires bears testimony to the fact that the general public are more and more realizing the cleanliness, convenience, and economy of substituting gas for coal. The advantages are obvious, and they particularly appeal to many householders who are experiencing great difficulty and inconvenience in these servant-problem days. Certainly many who, under stress of circumstances, are now being compelled to use gas for various domestic purposes in order to secure the maximum comfort and convenience with the minimum of labour, will never again voluntarily use the cruder fuel after having made the discovery of their lives.

Economic Value of Gas.

The economic value of gas to-day is simply enormous, and cannot very well be over-estimated. One shudders to think what would be the effect could it be manipulated and cornered like wheat. Probably one not undesirable effect would be to awaken the Government to a sense of its responsibility concerning the raw material, as well as the finished products.

Intrinsically, gas can very well stand on its own merits; but the intrinsic value, *plus* the economic value, of gas might, with advantage, be emphasized when dealing with prospective customers—not merely with a view to the cash nexus, important as this undoubtedly is, but from the loftiest patriotic motives. Although playing so very worthy and valuable a part in current affairs of national importance, it should not be forgotten that the gas industry's sphere of usefulness would be much extended as a direct consequence of an increased aggregate consumption of gas.

NOTES ON BYE-PRODUCT COKING.

[Communicated.]

Recovery of Ammonium Chloride.

Practically all coals carbonized in bye-product coke-ovens contain an appreciable amount of sodium and potassium chlorides, which, on decomposition, result in the formation of free chlorine or hydrochloric acid in the gas. This, on combination with ammonia, yields ammonium chloride. The disastrous effects of the alkaline elements on the brickwork of the oven wall are only too well known. In certain parts of West and South Yorkshire, and also in Derbyshire, the salt content is exceedingly high, and as much as one-third of the total ammonia exists as ammonium chloride—*i.e.*, as fixed ammonia. In one plant known in this area to the writer, the strength of the ammoniacal liquor was 1.4 per cent. total ammonia. Of this, 0·6 per cent. was fixed ammonia, and was practically all chloride.

The general method of dealing with this is to distil the chloride liquor with steam and lime in the usual way, liberate the ammonia, and convert it into sulphate. This is done both in the indirect and semi-direct recovery processes. In the hot or real direct processes, in which it is claimed no liquor is produced, and hence no stills are required, the ammonium chloride cannot be dealt with in this way. In any case, it does seem both waste of lime, acid, &c., and a roundabout way to treat ammonium chloride by means of distillation. In ammonium chloride, we have the ammonia fixed in a marketable form; and yet we bring about its dissociation, at considerable trouble and expense, only to refix it in a slightly different form. Is there any reason why this should be so?

The continued difficulty of obtaining regular adequate supplies of sulphuric acid has again caused attention to be directed towards the recovery of ammonium chloride, and the consequent saving in sulphuric acid. The ammonium chloride is very soluble in water, and by thoroughly washing the gas with hot liquor complete extraction is obtained. Naturally, some free ammonia is also absorbed by the liquor; but if the latter is hot, the absorption is reduced to a minimum. The liquor which is obtained does, however, contain some free ammonia; and in order to recover this, the liquor is boiled and the free ammonia driven off and led into the main gas stream, to be recovered as sulphate in the usual way. At the same time the chloride liquor is concentrated, and can ultimately be crystallized. The chloride that is obtained in this way is only a very crude product, and some purification is both necessary and desirable, in order that a remunerative price may be obtained.

If the coal is rich in chlorine, a considerable amount of chloride of ammonia is usually deposited in the pitch which collects in the pitch traps or the gas conducting and collecting mains. This, indeed, frequently is the best source of chloride, although it is, unfortunately, contaminated with pitch, &c. To recover it, the pitch is placed in a small vertical boiler fitted with a run-off cock at the bottom. The pitch is put into the boiler, covered with water, and then heated by means of a steam-pipe and thoroughly agitated. The chloride will dissolve in the water, and a crude liquor will be obtained. It is desirable to filter this in order to remove particles of carbon, &c., which tend ultimately to discolour the chloride. The crude chloride obtained is purified by recrystallization. It goes without saying, of course, that a pure chloride cannot be obtained in this way. A saleable commercial product is, however, easily obtainable; and when one takes into account the saving in lime and steam by avoiding distillation, and also the saving in sulphuric acid, it would appear that, in present circumstances at any rate, chloride recovery is worth while.

Stoppages in Pipes.

One of the most frequent causes of trouble on a bye-product coking plant is the occurrence of stoppages in pipes. These stoppages are very varied in character, and often arise through quite simple causes. Yet at the same time their occurrence is the cause of serious accident, or at any rate considerable loss. To maintain continuity of working, it is often necessary to resort to very drastic measures to overcome a trouble which by a little forethought could have been entirely obviated. Stopped ascension pipes are by no means infrequent. It is the general practice to inspect each ascension pipe every time the oven is charged; and on a well-regulated plant the valveman is instructed to push his "star" cleaning rod down the pipe to insure that it is not blocked. The man, however, does not always conscientiously carry out his duty, and the cleaning is frequently omitted, with the result that the pipe gradually becomes coated with soot and hard carbon. Once the deposit is allowed to form on the inside of the pipe, it increases very rapidly indeed.

Most ascension pipes are made in two or three sections, and the joints are not always air-tight, especially the bottom joint, where the pipe enters into the brickwork of the oven roof. If the plant is worked under suction, air is drawn in through these bad joints, and partial combustion of the gas takes place, with the result that the ascension pipes become hot. It is a good plan to inspect the pipes at night time for the fault, as any defective pipe will soon show up red hot. It must also be borne in mind that defective luting of the oven doors will also allow air to be drawn in and produce the same result. Hot ascension pipes almost invariably lead to trouble, not only due to blockage of the pipe itself, but also to pitch troubles in general. A certain amount of heavy tar deposits in the ascension pipe; and if the latter is allowed to become unduly hot, the tar is carbonized, and a hard deposit of pitch coke is left on the pipe. Such deposits can rarely be moved by the ordinary cleaning tools, and it is usually necessary to dismantle the pipe. A machine has been introduced at one plant in Durham for the purpose of cleaning ascension pipes. It travels along the top of the ovens on rails, and is fitted with a mechanical device by means of which each pipe can be thoroughly scraped and cleaned. In its present form, however, the writer considers that the machine is too cumbersome for general adoption. But the principle is right; and the mechanical difficulties should soon be overcome.

Blockages of the gas collecting and conducting main are, unfortunately, all too frequent on coke-ovens. The principal cause of the trouble is, of course, pitch. It has been pointed out already how hot ascension pipes result in the formation of carbon deposit in the pipe; and this also is the cause of most pitch troubles. As soon as the gas enters the collecting main, the heavier tar begins to deposit. If air is allowed to enter the ascension pipe, and this becomes hot, the gas itself is raised to a high temperature. This distils the tar, leaving only pitch in the main. At a moderate temperature this distillation does not take place, and the tar flows away easily. If, however, pitch is formed, this has a much greater viscosity; and instead of flowing away its progress is retarded, and it adheres to the main. Once a blockage occurs, it grows with alarming rapidity, as it serves as a trap for all other solid matter, dust, &c. The necessity for the continual scraping of the main is therefore obvious.

This raises the question which most coke-oven managers have to face at one time or another—viz., is it better to circulate liquor or tar in the gas-main? Both alternatives have advantages; and it is largely a matter of individual circumstances as to which should be used. Tar is undoubtedly a better medium for removing thick tar and pitch deposits from the main, on account of the fact that it exerts a solvent action on the deposit. It is, of course, essential that a thin tar should be used in order to promote easy circulation. At the same time, it must be borne in mind that, by circulating tar, there is always the possibility that this tar itself may be distilled and result in the formation of additional pitch deposit. If there is likelihood of hot ascension pipes and, consequently, hot gas, the writer would not advise tar circulation.

The principal objection urged against the circulation of liquor is that it is a bad plan to bring cold liquor into contact with the tar, as it has the effect of thickening the tar and retarding its easy motion along the main. If the liquor is brought in hot, there is

also the risk of a large loss of ammonia. It may be said also, however, that the liquor soon gets warm in the gas-main, and the warm liquor has the effect of softening the pitch and carrying it away. Perhaps the most important fact in favour of liquor circulation is its solvent capacity for ammonium chloride. It has already been seen from the previous note that much of the deposit which is found in the conducting main consists of a mixture of ammonium chloride and pitch. Indeed, this deposit is frequently referred to as chloride pitch. The liquor in circulation dissolves the chloride readily, and hence prevents accumulation of the deposit. From this point of view, the writer invariably recommends liquor circulation on plants where coal is used containing much chlorine. Continual scraping of the gas-mains is the surest way of preventing deposits; but even with the closest attention deposits do occur. If tar circulation fails to move the pitch, creosote oil should be circulated for a time. This is, of course, an expensive remedy; but the oil has a powerful solvent action, and will rapidly clear the main.

THERMAL PROBLEMS FOR GAS ENGINEERS.

IX.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

Extinguishing Coke.

Having already had occasion to refer to various details in connection with the combustion of coke, it will be convenient, at this point, to follow up other matters relating to the treatment and utilization of this residual in gas-works. Gas engineers have occasion to regard coke in a two-fold aspect, not only as a residual to be disposed of to the best advantage, but also as a material for raising heat in the retort-house, and for making carburetted water gas. It generally happens that the gas undertaking is by far the largest consumer of coke in the district.

In the time when coke was a drug on the market, there was little evident advantage in economizing its use. The Germans say that if we undertake any scientific investigation, we expect to make an immediate profit out of it. This is true so far as gas engineers are concerned. The directors of a gas company are inclined to encourage any new departure that promises an immediate improvement in working results; but they do not favour work or expenditure on the lines that are now known as "research." An important change of opinion in this respect is, however, now developing. The substantial encouragement being offered by the Government towards the progress of scientific investigation, not necessarily identified with immediate profit, cannot but assist the acquirement of more advanced ideas on this point among those who hold the purse strings.

Apart from this view, there is a great difference between surplus coke at anything from 5s. to 10s. per ton f.o.r. and an empty yard together with a figure of 25s. or 30s. per ton on the works price boards. Economies in the consumption of coke on the gas-works, formerly of little or no consequence, now assume a degree of importance that is by no means insignificant. If our Government had been assisted by a board of experts, as is the case in Germany, we should have heard more about detail of this nature, and less about discouraging the consumption of gas.

It has been observed that the amount of heat required to do the work of raising 1 lb. of coke at ordinary temperature to 1700° Fahr. is 328 B.Th.U. The extinguishing in the coke yard is the exact reverse. Coke wheeled out at a temperature of 1700°, or thereabout, is reduced to atmospheric temperature—say, 60°—and the amount of heat wasted by this process is also 328 B.Th.U. per lb. In a gas-works carbonizing 50 tons of coal per twenty-four hours, the weight of coke wheeled out and extinguished in the yard may be taken as 25 tons. The amount of heat lost in cooling it will be $25 \times 2240 \times 328 = 18{,}368{,}000$ B.Th.U. The effective duty obtainable from good coke, with the aid of efficient regeneration, is 10,000 B.Th.U. per pound. On this basis, the amount of heat going to waste in the coke yard is equal to that furnished by the combustion of 1837 lbs. (say 16½ cwt.) per twenty-four hours.

In small country gas-works, the stoker is frequently in the habit of leaving a barrowful of freshly drawn coke standing for some minutes, to suit his own convenience, with the result that it burns up and acquires a temperature of 2000° or more. As a consequence, the waste of heat may be increased to the extent of 25 per cent.; and the consumption of water which the stoker has to handle, and perhaps to pump, is increased in like proportion. No attempt is made to economize the quantity of water used in the coke yard. It is supplied in large excess, as evidenced by the fact that the liberated steam is damp, and by the quantity of the liquid that drains away. The only object in view is to complete the operation as rapidly as possible. The minimum quantity of water that would cool the 25 tons of coke—assuming that the whole of the liquid was converted into steam at 212°, which would mean the absorption of 1118 B.Th.U. per pound of water applied—would be $18{,}368{,}000 \div 1118 = 16{,}430$ lbs., or 1643 gallons. Such a figure is not even approximated to in actual practice. An experience with water supplied through a meter, extending over some years, goes to show the consumption is about four times this quantity.

As to the Quantity of Water Retained by the Coke.

Some gas engineers have been disposed to regard this matter with a certain degree of equanimity. Whether it is wise to do so, as regards the contents of the coke yard which are offered for sale, is an open question. But there can be no doubt as to the desirability of dry coke for use in the retort-house when cold coke is used, and especially in the carburetted water-gas house. Ideas as to the actual quantity of water that is retained by coke that has been extinguished in the usual course, and left to drain for six hours, or that has been soaked by actual immersion in water or by exposure to heavy rain, vary considerably. No doubt the quality of the material exercises an important effect. I have known coke loaded direct from exposure to the conditions last named to contain 10 per cent. of water. Some years ago, I was interested in two gas-works about ten miles apart, of similar size and design, and using the same brands of coal. In one the coke was always stored under cover, and in the other left in the open. But I could never find any difference as to the sales of coke per ton of coal carbonized, which proved that the coke exposed to all vicissitudes of weather did not gain appreciably in weight. A number of fragments, collected indiscriminately from all parts of the coke heap, lost from 2 to 5 per cent. in weight when dried at a temperature of 220°; and there was no greater loss from the exposed heap than from the other.

I am therefore inclined to believe that the water retained by reasonably drained coke does not exceed 5 per cent. But this is by no means an insignificant quantity, and may be to a large extent responsible for the common complaint that gas coke is slow to ignite. In the first place, it acts as a *pro ratâ* diluent. A ton of 5 per cent. coke consists of 19 cwt. of coke, and 1 cwt. of water. But, worse than this, it enters the furnace in the liquid state at a temperature of 60° Fahr., and must be converted into steam before the body of the fuel can rise above 212°, and the resulting steam must be raised to the full temperature of the furnace. The specific heat of the steam is high, and at 2200° may be taken as somewhere about 0·6. The latent heat of evaporation, 966 B.Th.U., must also be added. The heat absorbed in this manner will be:

$$\frac{966 + (2200 - 60) \times 0{\cdot}6}{20} = 112{\cdot}5 \text{ B.Th.U. per pound of coke.}$$

In the retort-house, about half the heat so lost may be recovered by generation, and possibly may not be altogether wasted in the setting. The moisture in the coke is on the same footing as an excess in the air supply. But the average consumer of the coke is not provided with regenerator furnaces. The best available duty per pound of coke that he can hope to obtain, after providing for the heat required to raise a combustion temperature, and for that carried off by the products of combustion, is about 6500 B.Th.U. The presence of 5 per cent. of water in the coke further encroaches on this quantity to the extent of $(6500 \div 20) + 112{\cdot}5 = 437{\cdot}5$ B.Th.U., or nearly 7 per cent.

With these points in view, the desirability of supplying bone-dry coke is worthy of consideration. It should command an increased price to an extent greater than the loss in weight, and encourage the use of coke for household and for many other purposes, by gaining for the fuel a better character than it possesses at present. The objectionable effect of 5 per cent. of water in the coke supplied to the carburetted water-gas cupola is so decided as to warrant the adoption of special means for drying the coke used for this purpose. As much will be evident from the remarks on blue water gas in No. VII. It may be claimed that the water so introduced would replace an equivalent quantity of steam, and be decomposed in the cupola—thus furnishing useful work. The objection is that, in such circumstances, the cupola is called upon to do work that could be more effectually conducted in the boiler, and that the advantage of supplying high-pressure steam is to this extent neutralized.

The consumption of dry coke is about 41 lbs. per 1000 cubic feet of blue gas produced, and adding 5 per cent. for water we get 43 lbs.—*i.e.*, 41 lbs. of coke and 2 lbs. of water. The additional tax on the cupola is $2 \times 1153{\cdot}9 = 2308$ B.Th.U. per 1000 cubic feet of gas; and the cupola is not a convenient or economical steam producer. As in the case of the retort-house furnace, the working temperature required is high, and the prejudicial effects of the water are greater than is shown by the additional absorption of heat.

This illustration is sufficient to indicate the possible loss to the purchaser of coke due to the presence of water. He may require to use the fuel for melting metal or for other high-temperature processes. As with the manufacture of water gas, coke supplied for use on motor lorries should be perfectly dry.

Incombustible Mineral Matter or Ash.

So far the effect has been ignored of incombustible matter in the coke, which contributes no useful effect, and not only leaves the furnace itself at the full temperature, but is apt to entangle and take away with it some part of the combustible matter. Any method—such as the introduction of steam or water at the furnace bars—tending to soften and disintegrate the clinker, is therefore to be commended, as this incidental effect is of more consequence than the amount of heat carried off by the clinker itself. Assuming that the coke contains 8 per cent. of incombustible matter, and that the specific heat of it is 0·25, the heat contained in the incandescent clinker is $0{\cdot}25 \times (2200 - 60) \times 0{\cdot}08 = 42{\cdot}8$ B.Th.U. per pound of coke.

Maximum Temperature of Combustion in the Furnace.

The maximum temperature that can possibly be obtained in the furnace—ignoring for the moment the losses by conduction, convection, and radiation that are continually going on—can be

ascertained as follows: The total heat produced per pound of 5 per cent. coke will be 13,000 − (650 + 428 + 64) = 11,858 B.Th.U. Taking the specific heat of the products of combustion as 0·3, their specific heat per pound of coke is 12·6 × 0·3 = 3·78 B.Th.U. and 11,858 ÷ 3·78 = 3137°. In practice such a result is never obtained, because the heat is dissipated as fast as it is generated by the causes above named; but it is obvious that the best working results are to be found in the direction of the highest possible initial temperature in the furnace.

(To be continued.)

COKE-OVEN PROGRESS AND LOW TEMPERATURE CARBONIZATION.

In the course of his Presidential Address to the members of the Institution of Mining Engineers, at the annual meeting held in Glasgow last Thursday—an address which touched primarily on the influence of science, education, and legislation on mining—Mr. Wallace Thorneycroft, of Glasgow, said they heard a great deal about the backwardness of this nation in the bye-product coke-oven business. He thought the first bye-product ovens ever erected were built by the predecessors of the Earl of Dundonald, about the year 1780; but the real home of the evolution of the bye-product oven, as they knew it to-day, was Belgium. It was nearly 25 years ago since he (Mr. Thorneycroft) first visited that country to study the question; and he then made it his business to inspect the various stages of the evolution. The old beehive oven first widened out in a plain arch slightly longer than its width, but still heated from within. Then it grew up from the ground like a chimney, and was heated by flues. Next it came to earth again, elongated, and got narrower and narrower, with side flues, vertical or horizontal, as they knew them to-day.

In the early days, the temperature in the ovens heated by flues was much lower than it was at present, and, of course, produced a softer coke. This softer coke was experimented upon by the late Sir Lowthian Bell; and his conclusions against the use of bye-product coke in blast-furnaces were recorded in his well-known and classic book "The Principles of the Manufacture of Iron and Steel." This authoritative condemnation of bye-product coke did more than anything else to delay in this country the progress of this type of coke-oven. Indeed, it was with some anxiety that he (Mr. Thorneycroft) persuaded his colleagues to adopt, after his visit to Belgium, the old Coppee non-bye-product oven, with vertical flues and some regeneration of the air required for combustion. This type of oven attained the highest temperature next to the beehive; and with it they succeeded in establishing a market for what was then known as patent-oven coke, and they very soon added more ovens from which the bye-products were recovered. In Scotland the bulk of the fuel used in blast-furnaces was raw coal; and in the recovery of bye-products from this raw coal, they had a striking example of the elaboration of an economical and improved process of manufacture carried out by the late Messrs. Alexander and M'Cosh, of Messrs. William Baird and Co. They also heard a great deal about the low temperature distillation of coal, and suggestions were made that no fuel whatever should be burned that had not first been carbonized to remove and utilize the bulk of the volatile products.

He knew of no particular difficulty in low-temperature carbonization except one, and that was the difficulty of making the process pay. So much depended upon the saleable value of the raw coal used; and while the quantity and value of the bye-products were considerable, the resultant char was the chief product. It was practically of the same bulk as the original coal and (say) 60 per cent. of its weight. It was soft and easily crushed, containing all the original ash, and would very readily absorb water. For these reasons it was difficult to sell at an adequate price. He was of the opinion that the probable evolution of this branch of their industry might be the development of a combined process treating, to begin with, at any rate, the very cheapest coal, firstly by distillation at the temperature found to yield the most valuable oils, and, secondly, by destructive distillation in some form of gas producer, so that the calorific value was available as gas. Prior treatment for the recovery of the oils would reduce the total amount of ammonia obtainable by the simpler gas producing plant; and it had yet to be proved that the value of the oils was greater than that of the loss of ammonia and the expense of working. The gas might then be utilized to generate electricity on a very large scale, and the power be absorbed in part by some electro-chemical or metallurgical process on the same site, and in part distributed for industrial and domestic use on the lines of the scheme outlined by Ferranti in his address to the Electrical Engineers in 1910. In time, it might be found economically sound to treat more valuable coal in this way; and he did not say it was outside the bounds of possibility to produce from certain classes of coal by low-temperature distillation a char that the public would buy for domestic use, and at the same time recover bye-products of sufficient value to make the process commercially successful.

The Fifth Annual General Meeting of the Municipal Water-Works Association will take place on Friday, the 6th prox., at the offices of the Metropolitan Water Board, Savoy Court, W.C.

COMPUTING TONS OF COAL A BIN WILL HOLD.

Writing in "Gas Age" [New York], Mr. W. F. Schaphorst, M.E., explains the working of a diagram to find the number of tons of coal any rectangular bin, bunker, or pocket will hold.

Referring to the accompanying diagram, he writes: Just lay a straight-edge across a couple of lines and column C immediately gives the tons capacity. For example: How many tons of coal will a bin hold that is 10 feet in height (column A), 10 feet in width (column E), and 20 feet long (column D)? Connect the height with the width, and locate the intersection with column B. Then, from the point of intersection run over to the length, and column C tells us that such a bin has a capacity of almost 55 tons.

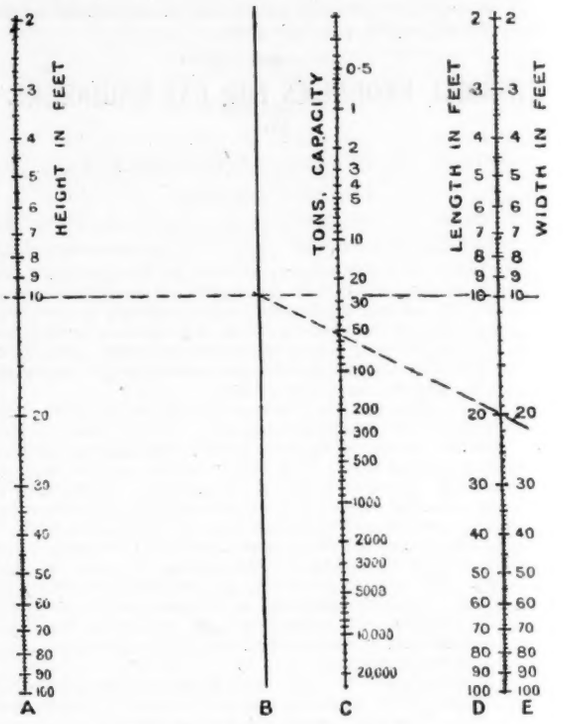


Chart for Approximate Computation.

The chart is good for either anthracite or bituminous coal. In general, anthracite is a trifle heavier; and the chart may run just a bit low for that coal, and a trifle high for bituminous. But for all practical purposes the chart will give good close results. It is based on the average weight of many different coals mined in the United States. Tons of 2000 lbs. form the basis of the chart.

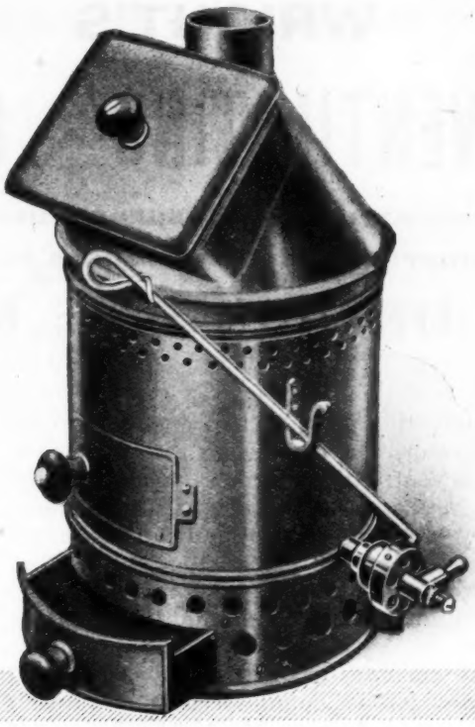
Where the bin is square, a single straight line will do the trick. For example, if the dimensions are 10 feet by 10 feet by 10 feet, a single straight line will show the capacity to be close to 27 tons. Try it yourself, Mr. Schaphorst says, and try several other problems. You will soon "catch on" and will use no other chart, nor will you ever care to do any "long-hand figuring" again.

Coal Economy Campaign.—The Board of Trade have, it is stated, been arranging to undertake, in conjunction with the War Savings Committee, a fresh campaign to secure greater economy in the use of coal. Since the last circular was issued, in the spring of this year, arrangements have been entered into with Italy to largely increase the exports of coal to that country; while at the same time demands at home have been daily increasing. It is hoped that the War Savings Committee, with their widespread organization, will be able to bring home to every household the need for economy in fuel.

Leeds University and Dye Research.—Under the general direction of Mr. A. G. Perkin (a son of Sir W. H. Perkin and brother of Professor Perkin, of Oxford), a new staff has been appointed to the dyeing department of the Leeds University. Some of the members will give special attention to the exclusive requirements of British Dyes Limited; but most of them will devote their services to work which may best meet the needs of other firms. In addition to the scientific investigation of anilines, the working-out of processes, and the study of the constitution of colour, particular regard is to be paid to coal tar distillation and the industrial application of cellulose. Mr. G. H. Frank, M.Sc., and Dr. J. B. Oesch, a well-known Swiss chemist, are retained on the staff, and with them will be associated Mr. P. King, Lieutenant A. E. Woodhead, M.Sc., Professor E. R. Watson, M.A., D.Sc., of Dacca University, India; and, as lecturers, Mr. H. P. Hird (of Messrs. Hird, Chambers, and Hammond) and Mr. C. F. Cross, B.Sc.

The Davis

Domestic "Burn-All"



A new Gas-heated Apparatus for the Rapid and Hygienic Disposal of every Species of House and Garden Refuse, wet or dry.

Overall size, 18¼ in. × 16¼ in.

Registration applied for.

—the essential complement of the All-Gas Kitchen.

Cooking and heating by Gas have bequeathed to the Industry the difficult problem of the disposal of house refuse and other accumulations hitherto burned up in the kitchen range.

This problem is satisfactorily solved by the Davis Dometic "Burn-All," which therefore supplies the one thing essential to complete the all-round utility of Gas for domestic use.

The Davis Domestic "Burn-All" is the concrete embodiment of long and patient study of the house refuse difficulty, and is recommended with the utmost confidence as a safe, practical, and economical solution.

The apparatus has been designed for placing on the top of the ordinary kitchen range if desired, and full instructions for fixing and use are issued in every case.

The constructional detail of the stove is the subject of a special pamphlet (copies of which are now available for distribution to consumers), but as a guide to its capabilities, it may be stated that by means of it—

A pailful of mixed kitchen garbage can be reduced to less ash than will fill the small tray provided, the burning taking less than one hour, and costing (with Gas at 3s. per 1000 cubic feet) not more than 1d.

Revised List Price 84s. (subject), permitting of extensive use at a quite moderate Hiring Rental.

Call and inspect Sample, or write for Special Pamphlet.

THE DAVIS GAS STOVE Co. Ltd.

The Gas Exhibition Salons, 60, Oxford St., London, W.

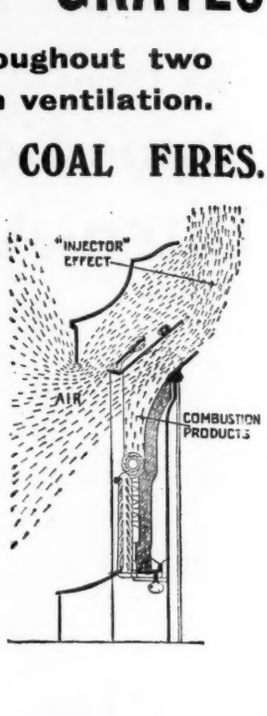
WRIGHT'S

"INJECTOR-VENTILATING" GAS GRATES

have now demonstrated in widespread use throughout two seasons their unapproached effectiveness in room ventilation.

VENTILATION AS EFFECTIVE AS THE BEST COAL FIRES.

The Method Explained.



The "Injector-Ventilating" invention provides two openings to the chimney. The under, or "Injector," one carries off the entire combustion-products; the upper, or ventilating, orifice carries off a large volume of ventilating air, use being made of the ascending current of the combustion-products by the neighbouring outlet to promote, by Injector action, this ventilaling function of the upper outlet.
The ventilating air is drawn from all points of the room.
The consumption is such that all possibility of high-temperature convection is avoided.
There is no admission of air currents in such a way as to cool down the whole stove-body, on which we count for that proportion of low-temperature convection, the indispensableness of which we have all along emphasised.

The Resultant Ventilation.

By this means the air of a room is changed a number of times in an hour—in some cases up to as many as six times.

Excessive Draught Avoided.

The "Injector-Ventilating" Fires avoid the excessive draughts caused by many coal fires—by which the feet are chilled while the body is being warmed.

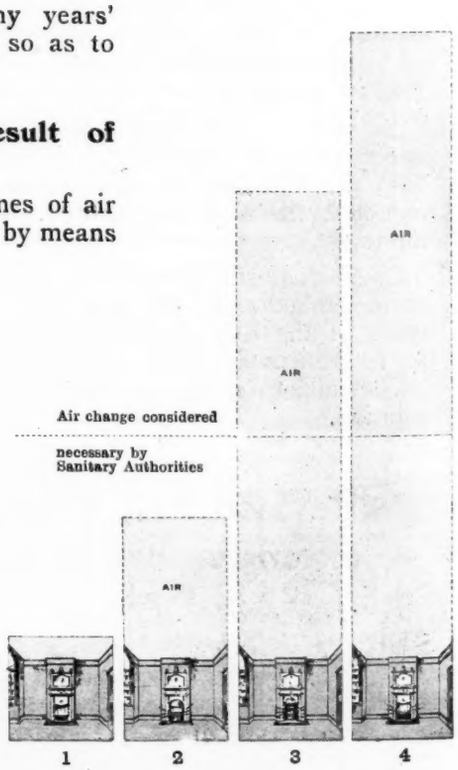
No Perforations in the Stove-body.

In these Fires we still continue our practice, of many years' standing, of avoiding all perforations in the stove-body so as to afford no harbourage for dust, germs, &c.

INTERESTING COMPARISON—The Result of Actual Tests.

The heights of the columns show the comparative volumes of air (in proportion to the size of room) which are carried off by means of the respective heating agencies.

1. Room to be heated.
2. Air change with ordinary gas fire.
3. Air change with "Injector-Ventilating" Gas Fire, with regulator open.
4. Air change with coal fire—excess tending to draught.



It will be seen how the amount of ventilation provided by the "Injector-Ventilating" Fires is substantially above the figure regarded as a suitable minimum by sanitary authorities generally.

THESE FIRES ARE ABSOLUTELY SILENT IN BURNING.

For further particulars see illustrated catalogue,
SENT POST FREE.

JOHN WRIGHT & CO.,
Essex Works, BIRMINGHAM.

MANCHESTER JUNIOR GAS ASSOCIATION AT BIRKENHEAD.

Members of the Manchester and District Junior Gas Association visited the Birkenhead Corporation Gas-Works on Saturday last. The party, who numbered about 50, included Mr. S. E. Whitehead, of the Ministry of Munitions.

The PRESIDENT (Mr. S. Carter), in introducing the members, thanked Mr. R. H. Brown, the present Engineer, and Mr. T. O. Paterson, the late Engineer, for their invitation to visit the works, and congratulated Mr. Brown on his recent appointment as Engineer and Manager of the works. Since their last meeting they had lost by death an esteemed member of the Council of the Association—Mr. C. E. Woodhead, of Manchester. To fill the vacancy on the Council, Mr. H. H. Mercer, of Widnes, had been co opted.

Mr. BROWN, in welcoming the visitors, thanked Mr. Carter for his reference. He had been a member of their Association for about eight years, and had derived much pleasure and benefit from their meetings.

The party was divided into three groups; and under the guidance of Mr. Brown, Mr. H. E. Stone, the Works Manager, and Mr. Watt, the Chief Draughtsman, a comprehensive survey was made of the shops, the vertical retort-house, the new exhauster-house, power-house, and pump-house, the water-gas plant, and the high-pressure pumping plant to the Land Street district gasholder, as well as the laboratory, the coal-testing plant, and the show-room in Argyle Street.

A number of interesting new features in gas undertakings were lucidly explained to the visitors. Special attention was drawn to the Woodall-Duckham vertical retorts, which have now been working for two-and-a-half years, which included a three weeks' strike of gas employees. The visitors were also shown the condition of five retorts which were under repair for the first time. Considerable interest was taken in the extensive system of telpherage for the handling of coke, and the method of loading coke on the line in the screening hoppers by means of automatic skip loaders. The actual daily working capacity of the plant is about 190 tons of coal. The large new exhauster-house, containing three sets of steam-engines and exhausters of 125,000 cubic feet per hour capacity, recently installed by Messrs. George Waller and Son, and which will be put into operation during the coming winter, was brought to the notice of the visitors. While inspecting the electric power-house, the new pump-house, and the boiler-house, it was pointed out that all these buildings contained large cellars with elevated floors, so as to give access to the pipes and connections, and also in order to preserve the plant from the possibility of damage by water; the works being subjected to tidal floods on the occasion of high tides and heavy rains.

The district gasholder station at Land Street, two-and-a-half miles away from the central gas-works, is a new addition to the Birkenhead gas undertaking; and much interest was taken in the compressor house, in which is placed the machinery for pumping the gas to the district holder. The house contains two sets of pumps, each set comprising a 80 H.P. cross compound steam-engine. Each set is capable of forcing 100,000 cubic feet per hour through a 10-inch steel main with welded joints, at an initial pressure of 4 lbs. per square inch, and a final pressure of 1 lb. per square inch. In conjunction with each set is a meter of 120,000 cubic feet per hour, to measure the gas pumped from the gas-works. These pumps draw their supply of gas from a small holder, of 750,000 cubic feet capacity, adjacent to the pump-house; and this is fed from the large holder, of 2¼ million cubic feet capacity, next to it.

GAS COMMITTEE'S HOSPITALITY.

Over two hours were spent by the visitors in inspecting the various departments, and afterwards, on the invitation of the Birkenhead Gas Committee, they partook of tea in the demonstration room of the new show-rooms in Argyle Street.

After tea, a hearty vote of thanks was passed to Mr. Brown and the Birkenhead Gas Committee, and Alderman J. H. M'Gaul, the Chairman of the Committee, responded.

Wales and Monmouthshire District Institution.—A meeting of the Institution will take place at Aberdare on Wednesday of next week, when the President (Mr. J. E. Kenshole, of Merthyr Tydfil) will deliver his Inaugural Address, Mr. H. D. Madden, of Cardiff, will read a paper, and a visit will be paid to the works of the Aberdare and Aberaman Gas Company.

Illuminating Engineering Society of America.—This week the tenth annual convention of the Illuminating Engineering Society of America is being held in Philadelphia; the President being Dr. C. P. Steinmetz, of Schenectady. There are well over a dozen papers on the programme, in addition to the presidential address, and reports by the Committee on Nomenclature and Standards and the Committee on Progress. The entertainment side has, needless to say, been also well looked after. The Convention is to be closely followed by a course of about twenty lectures on "Illuminating Engineering" at the University of Pennsylvania.

MODERNIZING THE AMSTERDAM WESTERN GAS-WORKS.

By M. VAN DER HORST, Mechanical Engineer.

[A Paper read at the Meeting of the Dutch Gas Association.]

The results of the working of the vertical retort plant at the Southern Gas-Works of Amsterdam [*ante*, p. 507] were such that it was not at all surprising that the modernization of the carbonizing plant at the other works should have been decided upon. This was the more natural, inasmuch as both of the old works had reached their maximum output capacity at the time the Southern works were started; the gas consumption showing a regular increase only slightly affected by the war and the curtailment of the public lighting. The Eastern works are entirely equipped with hydraulic charging and drawing machinery; whereas at the Western works these operations are, to the extent of 80 per cent., performed by manual labour. Therefore the latter works were the first to be taken in hand.

In the reconstruction of an existing large works, there are greater difficulties to contend with than in the erection of a totally new works; and at the Western works there were troubles of a special kind. Of the two retort-houses, one is partly served by a De Brouwer plant; the second house being under manual charging. No. 2 house was therefore intended for reconstruction. But the high-level railway for direct delivery of coal into the retort-houses enters the works from the side of No. 2 house, and passes through this building to No. 1 house. In order not to disturb the working of No. 1 house, the railway had, of course to be left intact. It was also desired that the side-walls of the retort-house should remain as they were, inasmuch as the works, which were built in 1883 and 1884 by the Imperial Continental Gas Association, were designed in good architectural style. It was further required that the daily capacity of the new plant should be at least 150,000 cubic metres. The existing coke-handling installation was to be connected with the new plant; and the coal-bunkers in the reconstructed retort-house had to be of a capacity equal to about forty hours' working, so as to cover from Saturday noon to 6 o'clock Monday morning. From various schemes, the tender of the Stettiner Chamottefabrik A.G. was selected, not only because this firm had erected the new vertical plant at the Southern works, but also from financial considerations.

The average capacity of the new plant will be about 180,000 cubic metres per 24 hours, to be produced in four benches of six settings each; there being eighteen 5-metre retorts in each setting, or a total of 432 retorts. The combustion gases will pass from the settings through underground flues to four chimneys, erected away from the building, to a height of 35 metres.

Coal intended for immediate carbonization will be brought by railway trucks into the retort-house, and discharged into shoots leading to the coal-breaker. An elevator of 60 tons per hour capacity will then take the coal to a storage bunker at the top of the retort-house; and from this it descends as required into the forty-hour capacity bunkers above the settings. This distribution is effected by means of four sheet-iron belts, so arranged that the failure of any one elevator will not endanger the coal supply to the retorts. When the storage bunkers are full, the railway-waggons are discharged over the whole length of the retort-house, into low-level coal-bunkers, constructed directly under the railway viaduct. Each of these bunkers holds 300 tons of coal; and from them the coal is conveyed on belts to the shoots already mentioned, and discharged into the breaker. Coal that is stored in the yard, on the north side of the retort-house, is emptied from small trucks into a shoot on the ground level on to an inclined belt conveyor, which takes it to another breaker inside the house. From this, the coal is in due course conveyed to the storage bunkers in the roof. Finally, the coal, as required, is passed into three-way charging devices, so that three retorts are charged simultaneously.

The supply of coke for the producers is furnished by means of a mono-rail and funnel-shaped trucks. For the removal of the coke, there are four De Brouwer conveyors, leading to small bunkers, from which it is emptied into trucks running on an inclined railway, and in their turn discharging into a large coke-bunker installed some 20 metres higher. Whether this mode of coke transport, with its repeated emptying and charging, will prove favourable to the quality and size of the resultant coke, is a problem which it must be left to practical experience to solve.

Drogheda Gas Undertaking.—In a report to the Drogheda Corporation, Mr. W. H. Saville (the Gas Manager) stated that eighteen months ago it was estimated that an increased revenue of £900 would be required in connection with the gas undertaking; and the prices of gas and coke were advanced to cover this amount. Now, on the further great advance in prices—particularly freights—the extra cost over pre-war figures was over £3000. They had an increased income from gas of £760, and from coke of £750, making a total of £1510, and leaving a balance of similar amount uncovered. Further, there had been a falling off in gas consumption, owing to reduced public lighting and the operation of the Summer Time Act; and this, with no corresponding decrease in expenses, had had the effect of increasing the cost of manufacture per 1000 cubic feet. Mr. Saville suggested that the prices of coke and gas be again advanced. It was ordered that a balance-sheet be prepared and submitted to the Corporation.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

British Association Fuel Economy Committee and Gas Power.

SIR,—Professor Bone, the Chairman of the British Association Committee on "Fuel Economy," has called my attention to the paragraph in your issue of Sept. 5 [p. 431], headed "Fuel Economy Committee and Gas Power," and has asked me to write you in regard to the matter, as the original forms referred to were issued by the "Power and Steam Raising Sub-Committee," of which I am Chairman.

I enclose herewith copy of the form which was sent to the different electrical undertakings. From this, you will see that all that was asked for was an estimate of the total power in use in the area, which the Committee thought would already be in existence. Judging from what you say, some of the undertakings have—apparently in order to obtain as complete information as possible—adopted the course referred to by you.

It is hardly necessary to say that our Committee, as a Committee, are not relying upon this method of securing information with regard to gas undertakings, since a representative of the Institution of Gas Engineers is on the Committee, and similar information to that which has already been asked for from electrical engineers by the Power and Steam Raising Sub-Committee will, I have no doubt, be asked for in due course by the proper Sub-Commtttee dealing with the gas undertakings.

I will ask the Chairman of the Committee to bring the matter before the next meeting of the Executive Committee after the recess.

CHARLES H. MERZ.

Collingwood Buildings, Newcastle-upon-Tyne, Sept. 15, 1916.

[We are obliged to Mr. Merz for his letter. It is clear from it, and from the copy of the official draft inquiry form that he sends us, that circulars and inquiries have been sent out, that exhibit either an excess of zeal or an inquisitiveness not intended by the Chairman and members of the Power and Steam-Raising Sub-Committee of the Fuel Economy Committee of the British Association. It is satisfactory to have this repudiation, and to learn that there is a prospect of the information as to gas power now being sought through the proper channel—the Institution of Gas Engineers. That Mr. Merz is correct in his surmise that more detailed information has been asked for than the Committee desired, and that our protest was fully warranted, are seen from a comparison of the official form and of one actually sent out of which complaint is made. In the official form the first twelve questions refer entirely to particulars relating to electric supply undertakings; the thirteenth (unlucky number) is as follows:

> *Estimated total power* used in factories in area of supply, whether purchasing electricity from the supply undertakings or producing their own power, electric or otherwise, by steam, gas, or oil engines in their own works, in B.H.P.

These are the detailed particulars sought in a circular actually sent out by an electrical engineer:

Name of Firm . . . . . .

Private plant—	B.H.P. (Approx.)
Electric	—
Steam-engines	—
Gas-engines (power)	—
Gas-engines (suction)	—
Oil-engines	—

Obtained under the auspices of the Fuel Economy Committee of the British Association, the "Private and Confidential" information would be extremely useful to the engineer of any electrical undertaking.—ED. J.G.L.]

Fuel Economy.

SIR,—In view of the recommendations of the Fuel Economy Committee to the members of the British Association at this year's meeting, I beg to hand you copy of my paper submitted to them on this subject. As the matter is of national importance, I thought it might be of interest to your readers.

The method of boiler-firing described has been worked out, owing to the Minister of Munitions taking over the bye-product gas producing plant, used for firing the boilers at the Langwith Colliery of the Sheepbridge Coal and Iron Company, where, owing to its position, the emission of smoke is barred.

Several collieries in the Yorkshire district are now using carbonate with results as given in the paper.

A. ROLLASON.

31, *Station Street, Nottingham,*
Sept. 9, 1916.

[ENCLOSURE.]

In view of the shortage of supplies of the best qualities of coal and the lower calorific value of that available, the most pressing question of the day relates to the economical use of the lower grades for manufacturing and domestic purposes.

The question of fuel economy, coupled with that of the prevention of smoke, has engaged the attention of our eminent chemists and engineers during the last sixty years; and numerous appliances have been introduced with these objects in view. But in no case when a coal high in volatile matter, containing a high oxygen content, has been burned, has there been any reduction in the volume of smoke given off, or any economy of coal.

It is apparent, therefore, that the reason must be found in the acquisition of physical or other properties by the vegetable matter during its transformation into coal; and, in order therefore to enable these lower grades of coal to be used, it is necessary to ascertain what properties the coal has acquired, and to evolve a method by which such coals (of which large supplies are available in every coal district) can be completely consumed, without the formation of smoke.

Experiments carried out show that during the early period in which the vegetable deposits had been submerged and covered by earth, they had been subjected to great heat and pressure, which, after driving off the watery constituents of the deposit, set up reactions resulting in the slow decomposition of the residue into atoms. This action is clearly shown in the layers of "Mother of Coal" found in the top beds of Yorkshire, Nottingham, and Derbyshire house coals, which consists of myriads of such atoms. On the cooling-down of the deposits, reverse reactions were set up—the atoms now combining according to their strongest affinities, forming water, fixed carbon, and hydrocarbons. The extent to which the reaction has reached in the deposits determines the percentages of these bodies in the coal.

The union of groups of carbon atoms to form molecules of amorphous carbon increased their density and gave to carbon a superior power for conducting heat.

An example of this property is shown in the working of internal combustion engines, where between 30 and 40 per cent. of the total available heat of combustion is conducted by the film of hydrocarbon lubricating oil to the cold cylinder walls without raising the temperature of the oil to any appreciable extent.

On combustion, the first effect of heating coal is to drive off its volatile constituents. With coal high in oxygen, the first portion driven off consists of water vapour and hydrocarbons; each vesicle of water vapour being surrounded by a film of hydrocarbon. Owing to the great quantity of heat rendered latent by the formation and vaporization of the large percentage of water driven off from these coals, the temperature of combustion is considerably lowered. The power of conducting heat of the hydrocarbon film into the vesicle of water prevents the hydrocarbon film taking up and retaining sufficient heat for the dissociation of its molecules into their atoms, with the production of a condition of motion necessary for their union with the oxygen of the air. Consequently, the hydrocarbons pass away with the water vapour unconsumed, forming dense volumes of smoke.

Further experiments showed that by neutralizing the power for conducting heat which carbon acquires, it now retains the heat taken up, and a high temperature is rapidly reached, which produces sufficient free energy necessary for the formation and vaporization of the water and for the hydrocarbon film to dissociate its molecules into their atoms, and to give to them the necessary motion by which they can enter into combination with the oxygen of the air and be completely consumed without the production of smoke. The neutralizing of the power for conducting heat of carbon liberates the water vapour at an early period of combustion, which results in a higher temperature being attained—in some cases as high as 350° Fahr.

By this method, the lower grades of coal attain a much higher temperature on combustion, equal to that of the best grades, and can therefore replace them for manufacturing and domestic purposes.

The most reliable neutralizing agent was found to be carbon dioxide; and when added in the form of pure finely-ground amorphous carbonate ("Avidimax"), it gave the most satisfactory all-round results.

Preparation of Ramie Fibres.

SIR,—For several years past a series of economic plants have been grown at Westfield, Reading, in order to give the townspeople (and especially the older children of the borough) an opportunity of studying some of the important plants used in industry and commerce.

This year, for the first time, a crop of the Chinese ramie nettle, *Boehmeria nivea*, has been grown. It forms an ornamental plant from 3 to 4 feet high, with small greenish flowers. I am anxious now to prepare some ramie fibres from my crop, and should be grateful if any of your readers can inform me of the *modus operandi*, or tell me where the information can be found.

JAMIESON B. HURRY, M.D.

Westfield, Reading, Sept. 14, 1916.

Bribery and Secret Commissions Prevention League.

SIR,—Absence from town has prevented me seeing before to-day a letter in your columns from Mr. H. E. Jones, the Chairman of the Wandsworth, Wimbledon, and Epsom District Gas Company.

Mr. Jones comments upon what he describes as my "suggestion as to the need for all the engineers and contractors to become members of the Bribery and Secret Commissions Prevention League and so purge themselves." What I suggested was that the Institution of Gas Engineers should become affiliated to the League, and so be in a position most effectively to deal with corruption, should occasion arise, which is a very different thing.

The League's four hundred members do not belong to the organization because they need purging, but because they wish to help in the war against bribery.

I thought that people in Mr. Jones's position would welcome a proposal made in the interests of clean and honest trading. It is surely not suggested that the gas industry is more free from corruption of the kind aimed at than comparable industries?

SECRETARY OF THE LEAGUE.

9, *Queen Street Place, E.C., Sept.* 15, 1916.

Acetylene Explosion at Nottingham.—By an explosion in connection with an acetylene gas-producing plant at Nottingham, two men had to be admitted to hospital suffering from burns on the face and arms. A portion of the machinery was shattered, and the roof damaged by the force of the explosion.

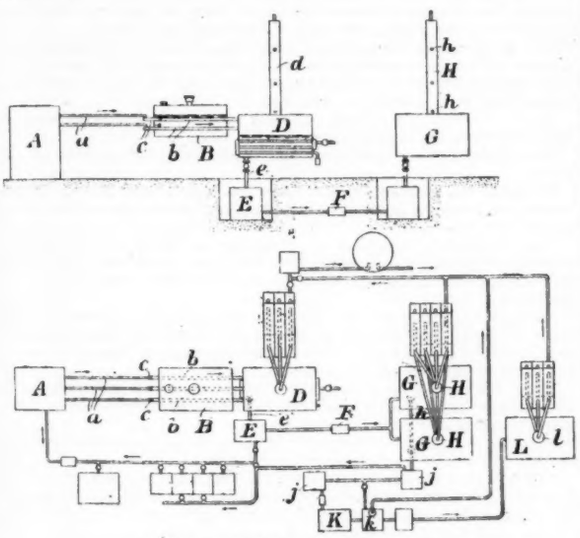
REGISTER OF PATENTS.

Cracking Hydrocarbons and Separating the Resulting Products.

LEWIS, G. P., of Brixton Road, S.W.

No. 7535; May 19, 1915.

This invention relates to apparatus to be employed "for the treatment of a great variety of hydrocarbons and in which the nature of the products obtained by the treatment can be varied, and the whole of the raw hydrocarbons can be transformed into commercially valuable final or intermediate products." It consists essentially in heating the hydrocarbons while under a pressure sufficient to maintain them in the liquid form at the temperatures employed to a high temperature and allowing them while still hot to escape into a low-pressure chamber maintained at a comparatively low temperature, wherein the hydrocarbon first wholly or partially vaporizes and is subsequently partially condensed—the converted portions boiling below the temperature of the low-pressure chamber passing off as vapour and being collected and separated.



Lewis's Hydrocarbon Cracking Plant.

A diagram is given showing one method of carrying it into effect—giving side elevation and plan.

The raw hydrocarbon is first passed through any suitable type of cracking plant A. The hydrocarbons are heated to a high temperature in pipes *a* of small diameter set in a heating chamber or in a bath of molten metal or the like—a pressure sufficient to maintain the hydrocarbons in the liquid form at the temperatures employed being maintained in the pipes. The hydrocarbon, after undergoing this treatment, is then partially vaporized and the volatile portion fractionally condensed. For this purpose, while still under pressure, it may be first sprayed into cooling and condensing tubes *b* of 3 to 6 inches in diameter by a spraying device *c*. The tubes are surrounded by a device B, in which they are cooled by water or other liquid or by a water spray or air currents, or in any manner capable of being regulated so that the pipes *b* may be cooled down to any desired extent. The cooling device consists of an enclosed chamber containing liquid and forming a steam-boiler or the like—an adjustable escape valve being provided for regulating the pressure, and thus the temperature, in the boiler. The hydrocarbons sprayed into the tubes are in this manner cooled down to a temperature approximating to that of steam at the pressure maintained in the boiler, which is preferably kept at atmospheric. In consequence, when the pressure on the hot oil is released by passage through the spraying device *c*, the hydrocarbon tends to vaporize immediately—an action which is checked to a certain extent by the cooling action of the cooling device B.

The tubes *b* are preferably so cooled that the temperature of oil and vapours at the outgoing end are reduced down to about 120° C. in the generality of cases; but for some oils (such as tar oils), it may be preferable to maintain a temperature of 170° C. in the cooler.

The oil being allowed to escape through the sprayer *c* at high temperature, practically all the oil will vaporize in the tubes *b*; but as the tubes are maintained at a comparatively low temperature, any hydrocarbon boiling above this temperature is condensed, and any liquid mechanically carried in the vapour will also be thrown down with the condensate.

Varying temperatures and pressures are employed in the cracking device A, according to the hydrocarbon to be treated, They vary from 400° to 550° C., and the pressures vary from (say) 100 to 320 lbs. per square inch.

The outgoing ends of the tubes *b* of the cooler B are connected-up with any suitable form of still D. The condensed or unvaporized residue flowing into the still is heated up in any suitable manner—such as by means of the steam-pipes *e*; any desired temperature being maintainable by regulating the steam pressure.

The still D is provided with a fractionating column *d* or supplemented by some form of fractional condenser. Where a fractionating column is employed, it may be provided with any convenient number of outlets for products of varying boiling points. A pipe, passing from ths top of the column, conveys away any gases uncondensible at ordinary temperatures, as well as any uncondensed vapours carried forward with such gases. Each of the outlet pipes terminates in a condensing coil set in a convenient tank, and has an outlet drip falling into a suitable condensate tank.

The residual liquid from the still D (consisting of naphthas, kerosenes, and other higher boiling hydrocarbons) is run off by a pipe *e* into a storage tank E, and thence is pumped, by a pump F, or otherwise fed into one or more secondary stills G, of any convenient construction, and heated in any suitable way, or the residue may be again passed through the cracking device A. The stills G are of similar construction to that above described, and the volatile distillates preferably pass into a similar fractionating or rectifying column H having a number of fractionating outlets *h* connected by pipes to condensers and the gasholder shown. The stills are preferably operated under vacuum.

Assuming that the working of the cooler B and the primary still D is regulated so that the liquid residue contains fractions corresponding to naphthas, kerosenes, and other higher boiling hydrocarbons, the liquor put into the secondary still will probably contain a small proportion of the lighter oils. Consequently, the condensate tanks from the still will probably contain some light oils, burning, solar, and lubricating oil. Any residue left in the stills G may be run off and repassed through the cracking apparatus with or without a proportion of new oil, or when, with continued repassing, the residue has become unduly heavy, it may be run into a heavy residue tank J for subsequent treatment.

The accumulated "heavy residue" may be passed into the retort K, where it is subjected to partial destructive distillation at such a temperature and rate of flow as will allow of a portion of the hydrocarbons repassing about three times before being finally reduced to oil coke. The retorts are worked under a slight pressure, and the whole or part of the gas from the gasholder may be passed through the retort for the purpose of rapidly sweeping-out the evolved gases; thus limiting the secondary action in the retort, and also promoting the combination of the hydrogen in the gases with any unsaturated bodies which may be present, so changing them into the saturated condition.

The gases and vapours evolved are passed into a fractionating condenser *k*, which condenses out bodies boiling under a given temperature—say, 200° C. The higher boiling bodies fall back to the heavy residue tank J for re-passage through the cracking plant A, or the retort K, as may be desired. Liquids boiling below 200° C. are subsequently re-distilled in a tertiary still L, of any suitable construction, but, preferably, similar to those already described, and having similar fractionating means *l* and so on. Fractions boiling below 130° are separated out as a mixture of light hydrocarbons, and consist mainly of benzene, toluene, and xylol. The remainder, boiling between 130° to 200° C., may be re-passed through the cracking plant A if desired. The "heavy residue," by continued re-passage through the retort, leaves a final residue of oil-coke, which is removed from the retort at intervals.

Obtaining Oils, Spirits, and Gases from Peat, &c.

MACNICOL, A. N., of Melbourne.

No. 10,679; July 22, 1915. Convention date, July 22, 1914.

This invention relates to obtaining oils, spirits, and gases from peat or other materials or substances containing gums, resins, or oils.

It has before been proposed, the patentee remarks, to convert the heavier hydrocarbons into lighter hydrocarbons by passing the hydrocarbon over a catalyst in a retort, mixing the treated hydrocarbon with steam, and passing the vapours to condensers and thence to a compressor and receiver. According to his invention, however, the material is first ground and fed into a revolving or stationary gas-tight retort—a gradual and regularly rising heat being applied externally, and the material being passed over the heated surface by a rotating rabble, agitators, or stirrers, or by gravity to the delivery end of the retort. The volatilized oils emanating from the substance treated are led off by pipe connections to a separately heated retort extension—catalytic agents being employed in the retort. Steam, hydrogen, or water gas are also admitted to the retort and (or) the retort extension. The gases are subjected to the action of a compressor, fan, or pump at suitable stages of the process, and to the action of condensers arranged at suitable stages of the process—valves being placed between the integers to regulate the pressure therein, whereby various kinds of oils and spirits in the gases may be extracted. The fan, pump, or compressor may be positioned between the retort and the retort extension in the pipes leading from the retort extension and in those pipes leading from the condensers—that is, at suitable points in front, and to the rear, of the compressors—to recover the varying grades of oil or spirit.

Firebrick Chequer Work for Regenerative Chambers.

GIBBONS BROS., LIMITED, of Lower Gornal, Staffordshire, and CLARK, F. W., of Palace Chambers, Westminster.

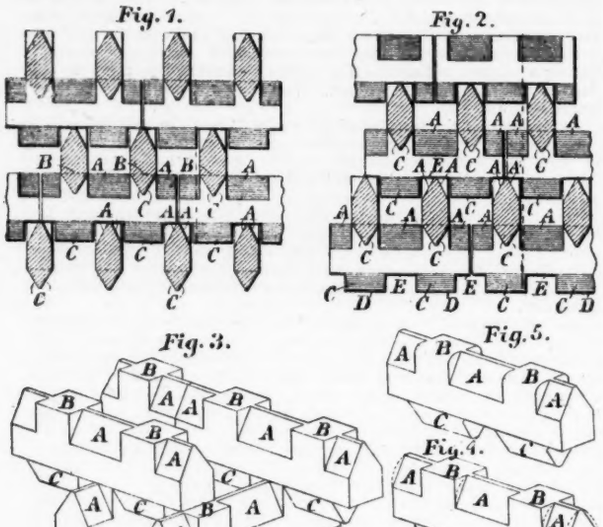
No. 11,911; Aug. 18, 1915.

This invention has reference to refractory chequer work and bricks to be used in any kind of gaseous heat exchanger—such, for instance, as regenerative chambers of furnaces and carburetting and superheating chambers of carburetted water-gas plant.

It is at present usual, the patentees say, to employ ordinary rectangular chequer bricks stacked in layers chequer wise—each layer comprising rows of bricks at regular distances apart with intermediate spaces and arranged at right angles to the rows of bricks and alternate spaces above and below; the rows of bricks in any layer being staggered with the next parallel rows of bricks above or below. Sometimes, however, improved bricks are employed in which the parts that are not in contact with the rows above and below are either rounded or roof-shaped—that is, made with double inclined sides so as not to

present horizontal surfaces for solid matter to rest upon, and so as to offer less resistance to the gases passing through the chequer work.

According to the present invention, the bricks, having their upper surfaces, or of those parts which are exposed to the gases, made rounded or roof-shaped as heretofore, are on the underside made with projecting double inclined or inverted roof shaped or rounded parts so disposed as to fit between the two or more cross rows underneath, and thus maintain the bricks at the predetermined and correct distances from each other.



Gibbons and Clark's Firebrick Chequer Work.

Fig. 1 is a sectional elevation of a portion of chequer work built with bricks so shaped. Fig. 2 is a sectional elevation of same at right angles to fig. 1. Fig. 3 is an isometrically projected view of a portion of the chequer work. Fig. 4 shows one of the improved bricks separately. Fig. 5 is a slightly modified form of brick.

A are the double inclined roof-shaped upper portions of the chequer bricks, and between them there are the flat-topped bearing surfaces B, on which rest the cross bricks in the next courses. C are the double inclined inverted roof portions provided on the underside of each brick. These are made of the proper length to fit between the bricks in the next cross rows below, and are staggered with those of the parallel rows above, so that between each of the bottom double inclined portions on each brick there is a space for the cross brick to fit in. This space preferably extends from the lower edge D of the intermediate portions to the base E, where the brick is of the full width. Thus it follows that when the bricks are stacked to form the chequer work with the rows of bricks in any layer staggered with the next parallel rows of bricks in another layer as in figs. 1, 2, and 3, the portions E of each brick rest upon the upper bearing surfaces B of the bricks in the cross rows immediately below between which the projecting pieces C fit, and thus maintain the bricks at the predetermined and correct distances from each other. Moreover, this arrangement brings the lower inclined portions of the bricks in about the same horizontal plane as are the double inclined or roof like parts A of the bricks in the cross rows immediately below; and as the inclines are preferably all of the same angle, it follows that the area of the spaces bounded by the four inclined sides is practically the same from the top to the bottom of the roof-like parts, and the speed of the gases is therefore maintained uniform.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 13.]

Nos. 12,467—12,800.

Chapman, T. S.—"Raising and forcing liquids by compressed air." No. 12,672.

Falk, Stadelmann, and Co.—"Fire lighters." No. 12,553.

Ferguson, H.—"Taps and cocks." No. 12,662.

Grossmann, J.—"Manufacture of ammonium nitrate." No. 12,532.

Hodgson, J. L.—"Fluid meters." No. 12,593.

Jackson, W. U.—"Gas producers." No. 12,595.

Miller, T. F.—"Stopcocks." No. 12,573.

Morris, A. J. S.—"Taps or valves." No. 12,738.

Murrell, S. F.—See Jackson. No. 12,595.

Richardson, H.—"Indicating change of pressure in gas-supply systems." No. 12,749.

Seddon, W. H.—"Rotary compressors, &c." No. 12,601.

Smith, W. S.—See Jackson, No. 12,595.

Weldless Steel Tube Company.—See Jackson. No. 12,595.

Young, J. W.—"Alarm for automatically announcing decrease or failure of gas pressure." No. 12,497.

The London Education Committee have instructed their schoolkeepers to exercise very great care in the handling of incandescent mantles, so that breakages may be reduced to a minimum. They are to retain the ash of all mantles, as arrangements will be made for its collection twice a year.

LEGAL INTELLIGENCE.

SCOTTISH GAS-WORKS AND DEPRECIATION.

Important Claim by the Motherwell Town Council.

The Valuation Appeal Committee for the Middle Ward of Lanarkshire had before them last Tuesday the case dealing with the gas undertaking of the Motherwell Town Council.

Mr. R. B. Walker, of the County Clerk's staff, explained at the outset that this case was before the Court last year;* and it was thought then that certain principles had been laid down which would enable an adjustment to be made. In the circumstances, the Committee were surprised to see the parties back again on much the same points.

Mr. James Burns, the Town Clerk of Motherwell, expressed the view that the question of depreciation, so far as the Motherwell gas undertaking was concerned, was settled at the last Court. The Motherwell Corporation had taken over the gas undertaking; and now it was a non-profit-earning concern. He protested against the Assessor treating the Gas Commissioners in this way. Once the principle of a thing was settled, they ought never to be before the Court again.

Mr. G. W. Hare (the Assessor) said Mr. Mackay, the Manager of the gas-works, claimed depreciation on everything. Last year it was only granted on meters and cooking-stoves; and he (the Assessor) had allowed the same concession this year.

Mr. R. B. Walker (Clerk): I think we gave depreciation either in that form or in the shape of renewals last year.

Mr. Mackay (the Gas Manager) contended that he got it on all the plant.

Mr. Walker pointed out that there was a difference between profit-earning and non-profit-earning concerns; and in the case of the latter, depreciation was granted on practically everything.

The Assessor: Now they are claiming, on behalf of the Motherwell gas undertaking, depreciation on buildings, machinery, mains, and service pipes—a thing that no other Assessor allows for, so far as I am aware.

Mr. Walker remarked that he could understand a different method being followed in regard to a private gas company; but this was a non-profit-earning concern, which must be treated in the same way as any other enterprises of a corporation.

Mr. Burns: You decided against the Assessor last year; and now he is asking you to hear it again. If he is not satisfied with your decision he has another Court to appeal to.

Mr. Walker (to the Assessor): Do you object to my statement of the position of a non-profit-earning enterprise?

The Assessor: I do. I am simply asking you to adhere to the last decision. You did not give depreciation on anything except meters and stoves. You allowed renewals on the plant; and I am perfectly content with that.

Mr. Mackay: I understood that I was allowed the whole of the depreciation because I brought proof and satisfied you that I was entitled to it.

Mr. Walker said he was prepared to advise the Court that non-profit-earning concerns were entitled to practically everything which was allowed for running the works.

Mr. Burns said that if the Assessor accepted this, the Gas Commissioners would be quite satisfied.

Mr. Mackay said that if the decision of last year was not upheld, he would press the Council to go before the Railway Assessor.

The Assessor: If you go to the Railway Assessor you will not get what you want.

Mr. Walker: The appellants are entitled to get reasonable depreciation on buildings, service mains, &c.

The Assessor: I do not agree.

Mr. Burns: If you do not accept the ruling of the Court, you must go to another Court.

The Assessor: This will be the only Court in Scotland that allows depreciation on buildings, mains, and service-pipes.

Mr. Mackay said it was not correct to say this.

The Assessor said he had endeavoured to get from Mr. Mackay what other Courts did, as he contended; and the only instance he could give him was that of Alloa. He had communicated with the Railway Assessor on the subject; and he submitted his reply, which did not support Mr. Mackay's contention.

Mr. Mackay said he knew what had been allowed at Alloa, as he had seen Mr. Napier, the Gas Manager there, on the subject. It was not at all as the Assessor contended. In Alloa they were allowed what was being claimed for on behalf of the Motherwell gas undertaking.

After some further discussion, the Court decided in favour of the appellants, and continued the case in order to permit of the parties adjusting the figures.

* See "Journal," Vol. CXXXII., p. 49.

Valuation for Rating of Coke-Ovens.

The Garngavil Coal Company, in appealing, at the Hamilton Valuation Appeal Court, against the coke-ovens at Swinhill Colliery being entered at £140, claimed that no value at all should be so entered, as it was simply a question of the treatment of the product of the colliery. The ovens were part and parcel of the whole, in the same way as screening plant was erected to make the coal marketable; and they might as well argue that the pithead buildings should also be assessed. The ovens were required for the running of the colliery and for the disposal of small material. The Court sustained the appeal, as they considered there would be a loss if the small coal was not so treated. The Assessor formally expressed dissatisfaction with the decision, and was given authority to appeal if he considered it necessary.

MISCELLANEOUS NEWS.

ANNUAL REPORT OF THE LIVESEY PROFESSOR.

The Chairman (Alderman C. F. Tetley, M.A.) and the members of the Livesey Advisory Committee have received from Professor John W. Cobb his report on the work of the Department of Coal Gas and Fuel Industries for the session 1915-16. It states that during the last twelve months the services of the department have been so greatly utilized by the Ministry of Munitions, and the number of students has been so much reduced that in this, the most strenuous year the department has known, the normal work has been lessened in amount.

STUDENTS.

Proceeding, Professor Cobb writes: At the beginning of the war, most of the students of the Department entered the Army at once, and are still there. Happily no serious casualty among them has been reported; and one of them, Lieutenant G. B. Howarth, has been awarded the Military Cross after being mentioned in despatches. Of the two students who completed their regular course in July, 1915, one, who took a Second Class Honours degree, is now engaged in the testing of high explosives, and the other, who took the diploma in Fuel and Metallurgy, worked for some time in my laboratory on the testing of coal tar, and is now chief chemist to a well-known firm, and engaged particularly in investigating possible improvements in the manufacture of malleable castings.

Only two new students took the ordinary courses during the year; and one of those entered the special gas corps of the Royal Engineers during the session. The other is under military age.

A circular from the Board of Education bearing on the exemption from military service of promising students of technology may result in a more considerable entry next October.

CORBET-WOODALL SCHOLARSHIP.—ARTHUR WALKER EXHIBITION.

It may simplify, too, the problem of the Corbet-Woodall Scholarship, which has been advertised this year, and has elicited a very satisfactory response, so that the intentions of the generous donor may be carried into effect, and a promising student enter into training here next October for the profession of gas engineering.

Since my last report, Mr. Arthur Walker has endowed an Exhibition for the higher education, in this department, of a deserving student from the Whitehaven district proposing to employ himself with advanced fuel technology, and especially the bye products of coal. The endowment is one of £90 per annum; and the first election was made on June 28.

In the case of neither of the above scholarships is the election under such conditions as to limit the competition to clever boys leaving school; consideration being secured for the claims of young men who have already entered the industry.

SPECIAL LECTURES.

It was realized that all connected with the carbonizing industries were so fully occupied at the present time that evening lectures were not likely to be well attended. Moreover, Dr. H. G. Colman, who in normal times, would have been lecturing, was too exclusively engaged with the Ministry of Munitions to be available for us. It was, therefore, thought advisable to limit the evening courses to such as were of direct service to the war. A laboratory course was given on Wednesday evenings to six students on the testing of tars (mainly for toluene and benzene), the testing of commercial benzol and toluol, and the determination of toluene and benzene in coal gas. A special lecture was also given on conditions of carbonizing as affecting yields of toluene and benzene. The course on refractory materials was not given.

RESEARCH.

Publication this year has been limited to these subjects:

(*a*) The report of the Ventilation Research Committee. Work has been carried out with care and success during the year by Mr. W. Harrison, on down-draughts, ventilating-burners, the "injector" principle as applied to the gas fire or burner, and the movement of air by hot products of combustion through vertical pipes of various dimensions. The results were reported to the Institution of Gas Engineers at their annual meeting in June. Mr. Harrison has quite recently been appointed to the permanent staff of another department of the University, and so will not be able to continue the work.

(*b*) A supplementary report on "Thermal Phenomena in Carbonization" by Mr. H. Hollings and myself was submitted to the Institution of Gas Engineers at their annual meeting in June.

Other research work has been carried out in the Department by Mr. W. Gibson for the Royal Society War Committee. Mr. Gibson was nominated by the University to the Commissioners of the 1851 Exhibition for one of their valuable scholarships. It was decided that none of these scholarships should be awarded during war time; but a War Bursary of the same value was allotted to Mr. W. Gibson for twelve months on the recommendation of the Royal Society War Committee, on the understanding that he would work, under my supervision, on a problem which I had proposed, bearing on the war. A report on the twelve months' work has been made to the Royal Society War Committee; and, on their recommendation, the War Bursary has been given for another year. This work deals with the conditions of decomposition of toluene, particularly in contact with red-hot carbon, and so is of direct interest to the carbonizing industries apart from such war value as it may possess. It is also concerned with the formation of benzene and toluene from other constituents of coal tar. Parallel work on xylene has been started, but is not proceeding because my collaborator has taken up an industrial position.

The war work which has taken up most of our time is concerned with coal tar (benzene and toluene) and high explosives.

In addition, metallurgical work has been done for the Ministry of Munitions including a set of experiments (in collaboration with the Department of Mechanical Engineering) on the influence of annealing copper shell bands at various temperatures, and the effect of slow cooling and quenching.

In all this work I have been assisted ably and zealously by my assistant lecturer Mr. H. J. Hodsman, whom I take this opportunity of thanking.

During the year the Department has received many distinguished visitors, including His Majesty the King.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

In view of the half-yearly general meeting of the Company to be held on Thursday of next week, the Directors have issued to the shareholders a report and statement of accounts for the first half of the present year.

They point out that the accounts to be submitted show a profit on the revenue account of £42,837; and, after providing for interest on the debenture stock and temporary loans, there remains a sum of £34,703. The Directors have appropriated out of this sum £4060, which has been placed to the credit of the special purposes fund—being a half-year's contribution of 10s. per cent. on the paid-up capital. This leaves a balance of £30,643, to which must be added the sum of £11,987, the balance brought from last account, and a credit from the income-tax account amounting to £308—making a total of £42,938.

The Directors recommend the declaration of the maximum statutory dividend on the consolidated ordinary stock of the Company at the rate of £5 2s. 6d. per cent. per annum, less income-tax. This will absorb the sum of £39,767, after which a balance of £3171 will remain to be carried to the next account.

The Directors, closing the report, say they feel confident that the shareholders will again be gratified with the result of the half-year's working—more particularly in view of the disturbances in Dublin which took place during the latter end of April, and the beginning of May, and the exceptional circumstances existing in consequence of the war.

Statements attached to the report show that the total amount of coal carbonized during the half year was 47,052 tons; that of 29,341 tons of coke made, as estimated, 12,625 tons (estimated) were used in manufacture; that of breeze made, to the estimated extent of 7161 tons, 3352 tons were used in manufacture; and that, while in December 1915, the tar in store as estimated amounted to 268,675 gallons, there was produced during the half year 461,172 gallons, and sold 513,374 gallons. The amount of ammoniacal liquor in store in December was 124,990 gallons; the amount made during the half year, 1,063,739 gallons; the amount used, 1,027,437 gallons.

The gas made was 775,833,000 cubic feet (including 225,971,000 cubic feet of carburetted water gas); and the gas sold totalled 618,309,000 cubic feet, of which 30,802,000 feet were for public lighting, 587,507,000 feet for private lights per meter, and 13,796,000 feet were used at the works. The total quantity of gas accounted for was 632,105 000 cubic feet; unaccounted for, 143,728,000 feet. [In this connection a note appears in the accounts: "This figure includes the gas lost during the Sinn Fein disturbances, and the gas blown away in clearing the mains of air."] Public lights numbered 4550.

PLYMOUTH GAS COMPANY'S CO-PARTNERSHIP.

New Rules to Prevent Strikes.

Sir Joseph Bellamy presided over a special meeting of the shareholders of the Plymouth and Stonehouse Gas Company, held last Thursday, when sanction was given to the creation and issue of the necessary amount of redeemable debenture stock for the acquisition of the tar-distilling works which the Company were authorized by their Act of the present year to purchase.

The subject of the co-partnership rules was then considered.

The Chairman said the Directors had always treated the workmen in a fair and generous manner. The wages paid were not less than the standard rate of the district, and in many cases above it; and, over and above this, the Company had for several years paid a bonus under the co-partnership scheme. It was, however, necessary to revise the scheme; and the Board asked the shareholders to sanction: (1) An increase in the rate and a widening of the scale of bonus; (2) the insertion of clauses providing for meetings between the Directors and representative co-partners, to deal with questions arising as to rates of pay or conditions of labour, and failing agreement the question to be referred to arbitration—any co-partner refusing to accept the arbitration award to be excluded from the benefits of co-partnership; (3) the forfeiting of the bonus for any current year in the event of any co-partner going on strike. It was explained, in answer to a question, that no shareholder would be asked to arbitrate.

The alterations and additions to the scheme were unanimously sanctioned—among those voting being representatives of the co-partnership.

Naked Gas-Light Fatality.—The use of naked gas-lights in a factory for the making of cattle food-stuffs was discussed at an inquest in Dublin on the body of Patrick Keogh, a labourer, who died as the result of burns sustained while he was at work. It appeared that deceased displaced some dry dust, which fell on a burning gas-jet, and caused an explosion; the blaze igniting Keogh's clothing. There were two gas-lights in the place, one of which was naked. The instructions were that the lights should not be used unless with proper shades. The Jury, in returning a verdict of "Accidental death," recommended that the Board of Trade regulations in regard to the lights should be strictly adhered to.

CALORIFIC STANDARD APPLICATIONS.

Sheffield Corporation's Opposition.

The objection which the Sheffield City Council have taken to the application made by the Sheffield United Gas Light Company to the Board of Trade for the substitution of a standard of calorific value for the illuminating power prescribed by the Sheffield Gas Order of 1910, formed the subject of a lengthy memorandum which was included in the minutes for presentation at last Wednesday's meeting of the Council. The memorandum, which was addressed to the Board of Trade, expressed the hope that the Board, after considering the Council's objections, will hold an inquiry before deciding upon an Order in the matter of the Company's application.

The representations and objections are to the effect that, prior to the Order of 1910, the quality of gas supplied by the Company was registered as 16 candles with a Sugg No. 1 "London" argand burner. The Order reduced the standard of illumination to 15 candles with the "Metropolitan" argand No. 2 burner. The Council allege that this reduces the illuminating power by from 2 to 4 candles. They object to a reduction of illumination, and also to the substitution of a standard of calorific power of a total heat value of 500 B.Th.U. per cubic foot, and point out that the present illuminating standard of 15 candles derived with the "Metropolitan" No. 2 burner would, with a standard flat-flame No. 7 burner, give a light of about 7 to 8 candles. It is contended that the proposed standard of 500 B.Th.U., under similar conditions, would yield only 5 candles, from which it is obvious that the ordinary type of flat-flame burner used by the average householder will yield an illumination of less than 5-candle power. As a result, the ordinary gas-burner will be thrown out of use as a method of obtaining illumination. A falling-off in power would also be experienced with incandescent burners, which, while not comparable with the loss sustained with flat-flame burners, would nevertheless be considerable. It is pointed out that South Yorkshire gas coal yields the finest quality gas, and that the Company can urge no difficulty in maintaining the present standard.

Dealing with the application as regards the reduction of the illuminating power of the gas, the memorandum states that a great number of dwelling-houses in the city use ordinary flat-flame burners, and a conversion of existing fittings to the incandescent system would entail expenses which would be unreasonable. A similar observation is made in respect to workshops. It is also urged that the vibration in many workshops makes the use of incandescent fittings impracticable. Alternatively, electricity is the only substitute, and its installation would place an unreasonable burden upon the owners or tenants of the premises affected. On these counts, it is urged that a reduction of light would constitute serious hardship, and also be an unwise action.

With regard to the application relative to the substitution of a calorific standard of 500 B.Th.U., the Council argue that before the 1910 Order the calorific standard was very high. It is pointed out that there are a large number of cooking-stoves, &c., in use in the city; and the alteration would impair the efficiency of these stoves. Consumers would be under the burden of increased cost consequent upon greater consumption following the poorer quality of the supply. Those using gas-fires, &c., will labour under the same difficulties. It is also remarked that an abnormal proportion of the gas consumption is for trade purposes.

The charges by the Company until July 1, 1915, were 1s. 3d. per 1000 cubic feet for supplies of less than 500,000 cubic feet annually; from 500,000 to 6,000,000 cubic feet, 1s.; and 10d. per 1000 feet above the last-named figure. For engines consuming over 100,000 cubic feet annually, the price was 10d. per 1000 feet. After July 1, 1915, the Company increased the prices 6d. per 1000 cubic feet all round. The Council assume that the plant installed for the production of benzol and toluol involved the Company in no loss. For some time, it is alleged, the quality of the gas supplied, both from the calorific and illuminating points of view, has been inferior to the pre-war quality. The increase of price is stated as 40 per cent.; and emphasis is laid on the fact that increased consumption would result from the reduction of quality.

In conclusion, allusion is made to the municipal ownership of the electricity undertaking, which would benefit by the success of the Company's application. It is stated that the Council, however, cannot disregard the serious loss to the citizens which would follow upon the supply of low-grade gas. The Council are advised that the supply of such gas would entail a saving to the Company of £30,000 per annum, and an increase of cost to the consumers of £66,000 annually.

On the minutes of the Parliamentary Committee being presented at last Wednesday's meeting of the City Council,

Alderman STYRING called attention to the application of the Gas Company. In 1910 the Company gave them gas, which, according to the standard they then had established, was equal to about 18-candle power; but under the authority they subsequently obtained, they reduced the standard from about 18 to 12 candles. The Company now proposed to further reduce it to what would be equal to about 5-candle power in the best type of flat-flame burner. The calorific value of the gas before 1910 was 620 to 640 B.Th.U.; and it was now proposed to reduce it to 500 B.Th.U. The result would be that in gas-engines, in which an enormous quantity of gas was consumed, in cooking-stoves, and in gas-fires, they would have to burn a very great deal more gas to get the same amount of heat and power. The ordinary flat-flame burner, of which such a large number existed in the workshops of the city, would practically be of no use whatever. This was the position they were going to find themselves in if the application was granted. He added: "If this is the best the Gas Company can do, the sooner they are removed from the sphere of operations, and let the Corporation undertake the work, the better it will be for the city."

Alderman WARDLEY complimented the Town Clerk on the way he had grasped the position of the working men with reference to the question.

Mr. O. C. WILSON said the Parliamentary Committee were to be congratulated on realizing the importance of the question. He hoped they would pursue the opposition to the proposals of the Gas Company to the utmost of their power, and that the Council's Directors on the Gas Company would do all they could do to oppose the desire of the Company,

The minutes were adopted.

The Matter Adjourned at Exeter.

At a meeting of the Exeter City Council last Tuesday, the Lighting Committee reported having considered an application to be made by the Gas Company to the Board of Trade for an Order to substitute for the existing standard a standard of calorific value of 500 B.Th.U. total heat value. Inquiries had, they said, been made on behalf of the Council as to the sufficiency or otherwise of the proposed calorific power; and it was found that such a standard had been inserted in recent Acts of Parliament. The Committee recommended that the application be approved, subject to the Committee being satisfied that the standard was sufficient.

Mr. CAMPION said that mantles were now used in the greater number of houses; and if the Council consented to the proposed change, it would only affect the very small number of persons who continued to use the old flat-flame burners. He presumed the alteration would be permanent.

Mr. GAYTON remarked that the calorific power during the last eighteen months had been very low for those who used stoves. If there was to be no improvement, it would be the duty of the Council to oppose the suggested action of the Company, with a view to getting a higher standard.

Alderman DEPREE pointed out that the illuminating power was not required to be anything like so great now as when fishtail burners were generally used. It would be more patriotic, instead of looking for what the Company would make out of the change, to have regard to the increased supply of toluol and benzol for the use of the Government which would result.

The TOWN CLERK said other corporations had agreed to the 500 B.Th.U.; and the Board of Trade had also assented to it.

It was decided to further consider the question at the next meeting; the Town Clerk explaining that, if necessary, he would apply to the Board of Trade to extend the time to receive objections.

Notice of Objection at Tottenham.

The Solicitor of the Tottenham Urban District Council reports the receipt of notice that the Tottenham District Light, Heat, and Power Company have applied to the Board of Trade for an Order under the Gas (Standard of Calorific Power) Act, 1916, to substitute for the standard of illuminating power prescribed by section 43 of the Tottenham and Edmonton Gas Act, 1906, a standard of calorific power of 500 B.Th.U. gross per cubic foot of gas, to exempt the Company from penalties in respect of a deficiency in illuminating power, and to substitute for the provisions imposing such penalties provisions imposing penalties in the case of deficiency in calorific power; and to substitute for the provisions as to testing for illuminating power provisions as to testing for calorific power. The Council's Solicitor has been authorized to lodge formal notice of objection to the application, and to take such other steps as may be necessary to protect the interests of the Council.

BURNLEY CORPORATION GAS UNDERTAKING.

Prepayment Meter Supplies.

In his report on the Burnley Corporation Gas Department for the year ended March 31 last, the Engineer (Mr. J. P. Leather) says that the make of gas shows an increase of 3,869,000 cubic feet, or 0·49 per cent., over the previous year. Last year, the decrease was 3·65 per cent. The gas made was 791,071,000 cubic feet (against 787,202,000 feet); and of this, 31,784,207 cubic feet, or 4·02 per cent., was unaccounted for. The lighting of the streets has been subject to many variations, owing to the restrictions by the military authorities and the desire to economize. Of the 3506 lamps in the borough and 152 lamps in parishes outside, many were not lighted at all; and the duration of lighting of others has been much below that ordinarily obtaining. The greatest number of hours any lamp was lighted is 3268, as compared with the standard number 3900. The consumption of gas during the year in the lamps within the borough was 31,290,000 cubic feet, as compared with 66,883,000 cubic feet the previous year. Outside the borough, the consumption was 800,200 cubic feet, against 2,269,200 cubic feet.

The gas sold brought in £82,561. Of the 791,071,000 cubic feet made during the year, there were 212,393,000 cubic feet, or 26·8 per cent., of carburetted water gas. For the production of coal gas, 50,460 tons of coal were used. The make of this gas, therefore, works out to 11,468 cubic feet per ton, as compared with 11,702 cubic feet per ton the previous year. For the production of the carburetted water gas, 490,790 gallons of oil were used, or 2·31 gallons per 1000 cubic feet. Last year the quantity used was 2·23 gallons per 1000 cubic feet.

There was a decrease during the year in the number of ordinary meters in use of 67, and an increase in prepayment meters of 296. The total number of meters in use now is 29,114, of which 16,315, or 56 per cent., are prepayment meters. The amount of money collected from prepayment meters during the year was £35,113. This corresponds to 286,658,493 cubic feet of gas. If this gas had been sold by ordinary meters, the amount receivable would have been £29,110—a difference of £6003. There are various items to set against this difference—the loss of meter-rent, the cost of collecting, the interest on the extra capital outlay, and the increased repairs of this class of meter. The meter-rent on 16,315 meters would be £815. The cost of collecting is £1069. The gas-rental from ordinary meters is collected by the same staff who collect water and other rates, who have to deliver accounts to all houses in the borough. The prepayment meters cost 24s. more

than ordinary meters; the extra cost representing an increased capital of £19,500. To this must be added £4300 for the cost of the breakfast cookers, which are supplied free with prepayment meters, making a total of £23,800. The interest on this amount, at 5 per cent. per annum, is £1190. The Local Government Board only allow ten years in which to repay money borrowed for meters and stoves. The life of a meter is much more than this; but the repairs of the prepayment meters are very heavy. The meter repairs for the year amounted to £2884, by far the greater part of which was due to the prepayment mechanism. The life of the breakfast cookers is very short; the repairs last year amounting to £273. Taking the repairs on account of prepayment meters at £1600, which is a conservative estimate, the various items named total to £4732.

NOTES FROM SCOTLAND.

Arbroath and the Summer Time Act.—From a statement made in the Arbroath Town Council, it is evident that the Summer Time Act has had an effect on the output of gas. It was reported by the Gas Committee that for the period from May 15 to Aug. 31 the gas manufactured amounted to 26,404,200 cubic feet, being a decrease of 1,541,600 feet over the corresponding period of the previous year. This decrease, it was stated, was the result of the Summer Time Act. The output had continuously increased, one year with another, during the summer months for a long number of years; and even with one hour less of lighting per day during the period under review, the output of gas was 53,000 cubic feet greater than it was for the same period of 1913.

Confidence in the Largs Gas Manager.—The question of the efficiency of the municipal gas-works management was, said the "Glasgow Herald" last Wednesday, again brought up at the monthly meeting of the Largs Town Council by the Gas Manager, who requested the Council to appoint a Committee to investigate the management and all appertaining to it, and submit a report to the Council. His reason was that the publication of the complaints made by Councillor Taylor at the last monthly meeting [*ante*, p. 362], and especially their appearance in a journal devoted to gas interests, had been extremely prejudicial to him, as casting reflections on his capabilities as a Gas Manager. The Council discussed the matter at considerable length; and the Provost finally informed the Gas Manager that the Council had considered his suggestion as to an inquiry, and had come to the conclusion that the case would be met if there and then the Council unanimously expressed their entire confidence in the way he conducted the affairs of the gas-works. He asked if this public expression of confidence by the Council would satisfy him. The Manager replied in the affirmative.

Inverness Gas-Works Improvements Needed.—In the annual report of the Treasurer of the Inverness Town Council, it is stated that, as soon as the war is over, consideration must be given to the urgency of modernizing the gas-works, including the installing of an improved system of retorts, and up-to-date mechanical appliances to lessen the dependency on manual labour, and to enable gas to be produced at a moderate cost. Last year the rate to consumers was increased by 10d. per 1000 cubic feet, and this year by 5d.; the charge being now 4s. 2d. per 1000 feet.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 18.

The tar products market here is steady, but uneventful. There is some inquiry for pitch for export; while important quantities are being sold for carbonization. Makers' price for export is unchanged at 20s. net per ton *ex* producing works. Creosote is firmer again, the American position having improved, and makers ask 4d. to 4½d. net per gallon for home trade. Crude tar is worth about 2¼d. per gallon delivered.

Sulphate of ammonia is in good demand at the price last reported.

Tar Products in the Provinces.

Sept. 18.

The markets for tar products remain practically the same. In pitch, there is very little inquiry; but business is somewhat difficult, owing to the uncertainty of freights. Solvent naphtha is in fair demand. Creosote is still very quiet. Sales are reported at low prices.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. 6d. to 19s. 6d. Pitch, East Coast, 16s. to 16s. 6d. per ton; West Coast, 15s. to 15s. 6d. Manchester, 16s. to 16s. 6d. Liverpool, 17s. to 18s. Clyde. Benzol, 90 per cent., North, 10½d. to 11½d.; 50-90 per cent, naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6⅝d. Solvent naphtha, naked, North, 1s. 10d. to 1s. 11d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2d. to 2¼d. Heavy oils, in bulk, 3⅝d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2½d. to 2⅝d. per unit; "B" quality, nominally ⅜d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Sept.* 16.

Throughout the week the market for this material has remained steady, although the War Trade Department have continued to withhold export licences. A large quantity of sulphate has now been earmarked for home agricultural and munition purposes, and middlemen have been willing to pay full prices for the parcels offered for export. Quotations for prompt delivery are unchanged at £17 15s. per ton f.o.b. Hull, £18 f.o.b. Liverpool, and £18 2s. 6d. f.o.b. Leith. In the

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forward position, it has transpired makers have again realized £18 5s. at best ports for October-December, 1916, as well as the same figure for January-June, 1917.

Nitrate of Soda.

There is no alteration in this market, and holders on spot still require 17s. 6d. per cwt. for ordinary and 18s. for refined.

Sulphate of Ammonia.

From another source, it is reported that to-day's prices of this article are as follows: Outside London makes, £16 15s.; Hull, £17 12s. 6d.; Leith, £17 15s. to £17 17s. 6d.; Liverpool, £17 15s.; Middlesbrough, £17 12s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is still quiet, though there appears to be more forward business in course of negotiation, with the prospect of an early settlement of the agreed prices for some of the Italian ports. For prompt shipment, there are full supplies of fuel generally, and prices are easy when steamers can be early guaranteed. In the steam coal trade, best Northumbrians are rather irregular, but from 37s. to 42s. per ton f.o.b. may be looked on as the current quotations, for delivery over this month. Second-class steams are from 29s. to 33s. per ton; and steam smalls are weaker, because licences for shipment have not been so freely granted of late, so that the prices may be said to vary from 18s. to 22s. 6d. per ton, according to the quality and the time of export. Production seems to be fairly good, and—apart from the question of licences—the output is well taken up. In the gas coal trade, though there does not seem quite as much pressure, the demand is steady, and appears to be growing. Best Durham gas coals are from 33s. per ton f.o.b.; but there have been sales of cargoes at lower prices, where shipping has been needed and become early available. Second-class gas coals are about 28s. to 30s. per ton; and for "Wear Specials" from 34s. to 37s. per ton f.o.b. are among the quoted prices. One of the reasons for the lower range of prices quoted is the expectation that "schedule" prices will extend to other of our Allies than France; and thus competition may perhaps be keener for sales to the neutral nations, though to the latter high freights may still prevail. Gas coal freights seem rather steadier at 12s. from the Tyne to London; while to the French ports the scheduled figures are steadily maintained. As yet, the railway difficulty has not affected the coal trade; for it is assumed that it will be settled in the course of a few days. Coke is steady generally. Good gas coke is from 33s. to 35s. per ton f.o.b. Tyne. The exports of coke are very heavy. The total shipments from the Tyne for eight months this year were 600,000 tons—just about threefold those for the same time last year, though 37s. per ton freight has been paid to Rouen in the last few days.

Lucas Lamp Accessories.

Under the Trading with the Enemy Act, and by order of the Controller, the stock-in-trade, plant, and tools of Messrs. Moffat, Ross, and Co., Limited, were sold by auction last Tuesday. We learn that Messrs. A. E. Podmore and Co., of 34, Charles Street, Hatton Garden, E.C., have bought every available piece of material appertaining to accessories for the Lucas intensified lamps; and so now any person desiring parts of these lamps for renewal purposes will be able to buy them from Messrs. Podmore and Co. They have also arranged for the services of the late Secretary and Manager of Messrs. Moffat, Ross, and Co., Limited, and thus business in connection with the goods in which the now defunct firm have traded will be carried on under better circumstances than it has been of late.

Exemption Applications in South London.

At the Camberwell Tribunal, W. Haworth, Estimating Inspector in the employ of the South Metropolitan Gas Company, applied for exemption on business grounds, and that he was engaged on work of public utility. The Town Clerk pointed out that an arrangement had been arrived at with the Gas Company that in cases of employees making personal appeals of this nature, they were not supporting them. They had agreed with the Tribunal as to the men whom they deemed indispensable, and the applicant was not in their list. He had, therefore, no right to an appeal on business grounds. Applicant said he had been with the Company fourteen years. His application for exemption was refused. A service layer's assistant, E. J. Organ, also employed by the Company, applied for exemption on personal grounds, but his appeal was not supported by his employers. The application was refused. At Bermondsey, Charles W. Gower, Consulting Engineer, applied for exemption on business grounds. He said he had applied for a badge, but had been refused, although he was engaged on attending to gas-engines in munition works. Applicant had had 24 years' experience, and six of his men had joined the army. He was supervising engines for the South Metropolitan Gas Company in munition factories; but even then he could not get a badge, though the carmen delivering his goods had badges and clerks in counting-houses had them. An engineer like himself could not get one. He interviewed the Minister of Munitions, and was told that if he liked to close his business and go into a munition factory he could have a badge. This, however, he refused. He was granted conditional exemption, as was, also, a gas-engine fitter in his employment.

Tuscan Gas Company.—The report of the Company for the year ended March 31, which was submitted at the meeting last week, showed that, after writing off £2783 for loss on exchange, £4370 for Italian taxes, and £4270 for renewals and maintenance, a loss of £22,821 was made. After deducting the credit balance of £1223 brought forward, a debit balance of £21,598 remained.

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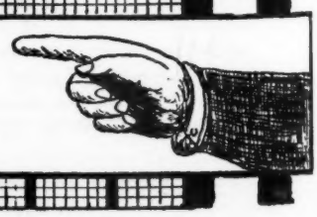

London Office—
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OLD BROAD ST., E.C.

Fire at a Tar Distillery.—A serious fire broke out last Thursday at the works of Messrs. Cross and Sons, tar distillers, of Barking. Efforts to isolate the fire were fairly successful, but the block of buildings in which it broke out was practically destroyed. The damage is estimated at £20,000.

Dover Gas Company.—The accounts submitted at the recent meeting of the Company showed that, in spite of the very heavy cost of coal and other materials, and the high rates of freight and labour now ruling, the net profits of the past half year amounted to £3288, which, added to the balance brought forward from the previous half year, gave an available balance of £8520. The Directors therefore recommend a dividend for the six months ended June 30 at the rate of 7½ per cent. per annum, less income-tax, leaving £5520 to be carried forward.

Gas Charges at Bolsover.—The Bolsover Urban District Council have been discussing the Gas Company's street lighting account for £34 for the quarter ended March 31. Objection was taken to the fact that the Company had continued to charge in respect of lamps which early in the year were extinguished by order of the police; but Mr. Day pointed out that the Company could legally claim payment of the account in full. In reply to the Council's communications, the Gas Company wrote that they were prepared to consider the lighting agreement cancelled as from March 31, on payment of the account in full; and that no further account would be tendered in respect of the completion of the lighting season, during which nine lamps were in use. After the Clerk had remarked that they were being excused payment of a sum of about £38, the Council accepted the Company's offer.

Woking Gas Supply.—The meeting of the Woking District Gas Company was held last week—Mr. Samuel Spencer presiding—when the Directors reported that for the half year ended June 30 the sales of gas showed a decrease of 13·8 per cent., when compared with the corresponding period of 1915; while receipts from residuals were less by £123. These results were largely due to the fact that there was practically no public lighting during the half year; and there was also a small falling off in the quantity of gas used by private consumers of 3·77 per cent. The revenue had been £10,447, and the expenses on revenue account £8607, leaving a net profit of £1840, to which had to be added the balance brought forward from the last account—£2293. After making the usual charges for interest, there remained an available balance at the credit of the profit and loss account of £3718. The Directors recommended the payment of dividends on the preference stock at the rate of 5 per cent. per annum, and on the "A" and "B" ordinary stocks at the rate of 5½ per cent. per annum, which would absorb £1739, leaving the sum of £1979 to be carried forward. Referring to the accounts, the Chairman said it was fairly satisfactory that they had passed through the half year with no larger difference than £276, and were able to pay the same dividend as for the corresponding period. Considering all the circumstances, their Manager (Mr. W. H. Ely) had produced a result as good as was expected.

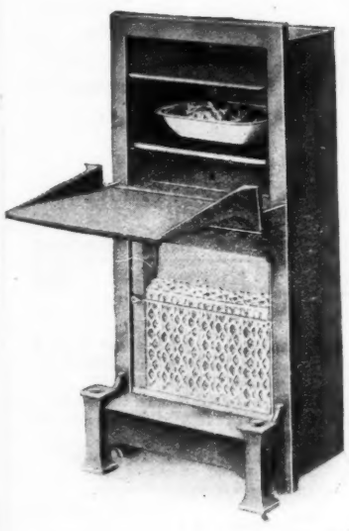
Benzol and Toluol Extraction at Walsall.—The Walsall Corporation Gas Committee have received a letter from the Ministry of Munitions stating that a further installation is needed at the Pleck Gas-Works in order to meet the growing requirements for benzol and toluol, and that Lord Moulton hoped the Corporation would instal a plant at the earliest possible moment. The Gas Engineer (Mr. B. W. Smith) presented a report on the matter, and the Committee recommend (1) that a de-benzolizing plant be installed at the Pleck works, for the purpose of increasing the output of benzol and toluol, at a total estimated cost of £3000; and that the tender of Messrs. W. C. Holmes and Co., Limited, for providing the necessary apparatus for the sum of £1951 be accepted. The plant will, it is estimated by the Engineer, earn after the war an income of 14 per cent. on the capital outlay.

Government and the Coal Supply.—There was a conference in London last Thursday between the Executive Committee of the Miners' Federation of Great Britain and Lord Milner, who is supervising the various Committees dealing with the coal industry. The conference, which was private, lasted about two hours; and the "Manchester Guardian" says there is reason to believe Lord Milner laid before the miners' representatives suggestions for giving the Government more complete control over the whole coal industry, both, it is understood, for home consumption and for export, though the most immediate requirement is to place the coal for export (to destination, price, and quantity) more thoroughly in the hands of the Government. Nothing at all approaching finality is thought to have been reached; the suggestions being laid before the representatives to see whether they would agree. The matter will be considered by the Miners' Executive at a further meeting.

Geyser Fatalities.—Commenting on the fatality (reported in last week's issue, p. 518) to two soldiers connected with the Canadian contingent at Shorncliffe, through inhaling the fumes from gas-geysers in the bathrooms at the military hospital attached to the camp, our contemporary, the "Ironmonger," writes: We cannot add much to the brief announcement which has appeared in the Daily Press, because the military authorities, for reasons which will be obvious, are anxious that as little publicity as possible should be given to the incident. We understand that the name of the manufacturer of the geysers was withheld at the inquest; and to take this course was fair from one point of view, because it appears that the Royal Engineers attached to the camp had altered the apparatus by removing the original oil-lamps and substituting therefor the gas-burners which led to the fatalities. As the evidence showed, no provision was made for flues; and the result was a repetition of the accidents which have occurred so many times before. Now that such a fatality has occurred in a military camp, is it too much to hope that the authorities will take steps to make it a legal offence to fix a geyser without a proper flue communicating with the atmosphere outside the building in which the geyser is installed? This is a reform for which we have pleaded for years past. But because it is simple, it is neglected; and the result is a succession of these deplorable accidents.

Richmond's New Designs.

Season 1916-17.



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THE RICHMOND GAS STOVE & METER CO., Ltd.,

LONDON AND WARRINGTON.

A Resignation Withdrawn.—Mr. H. C. Gripton, Gas Manager at Strabane, who tendered his resignation to the Urban Council on the ground that some of the members had shown a want of confidence in him [*ante*, p. 520], has yielded to the earnest solicitations of the majority of the councillors, and decided to retain his position.

Milnrow Gas Company.—The report and accounts for the six months ended June 30, which were approved by the shareholders at the meeting, showed that there was a balance available for distribution of £819. It was decided to pay a dividend of 9 per cent. on the 10 per cent. shares, and of 6 per cent. on the 7 per cent. shares.

Price of Gas South of the Thames.—The Gas Light and Coke Company announce a reduction of 2d. per 1000 cubic feet in the price of gas on the south of the Thames, to take effect from the Midsummer quarter. This step brings the price, in accordance with their Act of Parliament, into line with that of the South Metropolitan Gas Company—2s. 8d. per 1000 cubic feet.

Co-operation between Organized Labour and the Government.—Acting in his capacity as Labour Adviser to the Government, Mr. Arthur Henderson has invited fifteen trade union leaders to form a Consultative Committee, with a view to establishing a regular and definite means of co-operation and communication between organized labour and the Government. One of the leaders so invited is Mr. Harry Gosling, the President of the Trade Union Congress, and another is Mr. J. R. Clynes, M.P., of the General Workers' Union.

Pintsch's English Business Disposed of.—At the Mart last week, Messrs. Fuller, Horsey, and Co. disposed of the shares in Pintsch's Patent Lighting Company, Limited, the authorized capital of which was £60,000, with £35,000 paid up. During the period of ten years ended June, 1914, the Company paid in dividends and bonuses to the ordinary shareholders 500 per cent. on its paid-up capital. According to the last-issued balance-sheet, which contained no credit for goodwill, the assets showed a surplus of £57,912 over the liabilities, or upwards of 60 per cent. more than the paid-up capital. The price per £5 share at the auction started at close on par and got whittled down to 77s. This sale by the Public Trustee, the "Pall Mall Gazette" remarks, removes the enemy taint.

Public Lighting of Thurles.—At the meeting of the Thurles Urban District Council, it was reported that the Gas Company had offered to do next season's lighting for £120, which was £20 in excess of the last contract price. Mr. Carroll said he considered that the price demanded was exorbitant, and the £100 charged last year was also too much. Mr. Mockler suggested that only half the lamps should be lit, and an estimate obtained from the Company for this; while Mr. Dalton considered that 20 lamps, out of 63, would be enough. Mr. Lamb (the Chairman), on the other hand, suggested that they should let the winter go without the use of the public lamps. Mr. Butler thought it would be a disgrace not to light the gas, and said he did not see where the economy would come in. The Council decided not to accept the Company's offer.

Decreased Consumption at Ryde.—There was during the past twelve months a considerable decrease in the sale of gas at Ryde, which was accounted for by the restriction in the hours of public lighting and the operation of the Summer Time Act. The balance available for division was £3205, out of which the Directors recommended the authorized dividend at the rate of 5 per cent. Owing to the increase in the cost of coal, freights, labour, and all materials, it will be necessary to raise the price of gas.

Tamworth Gas Company.—At the annual meeting of the Tamworth Gas Light and Coke Company, the Directors recommended that the usual dividend of 20s. on each old share and 14s. on each new share be paid for the half year ended June 30. They reported that, owing to the restricted public and private lighting and the Summer Time Act, the consumption of gas had been reduced by 4,254,000 feet. The report and accounts were adopted; the Chairman (Dr. A. M. Sculthorpe), in moving the resolution, alluded to the death of Mr. Martin S. Wales, who was Chairman of the Company for 24 years.

Elsecar, Wentworth, and Hoyland Gas Company.—In submitting to the shareholders the accounts for the twelve months ended June 30, the Directors of the Company reported that the gas manufactured during the year was 40,492,000 cubic feet, a decrease of 3,294,800 cubic feet. Sales of gas through ordinary meters showed a decrease of 1,085,600 cubic feet, those through prepayment meters an increase of 803,600 cubic feet, and the public lamps a decrease of 1,740,400 cubic feet. The profit was £1093, which, with the balance from last year, after payment of interest on loans, left a net profit of £2416, from which the Directors recommended dividends of 10 per cent. per annum upon the stock and £10 shares, and 7½ per cent. per annum upon the additional capital £5 shares, less income-tax. The Board regretted to record the death of Mr. Walter Kingston, who had been a Director over thirty years, and Chairman since 1905. The Secretary and Collector (Mr. Albert F. Hall), having obtained another situation, left the Company's service on Aug. 31 last. The Directors much regretted his removal from the district, and recorded their warm appreciation of his valuable services, he having been connected with the Company since 1895.

The Directors of the Richmond Gas Stove and Meter Company have decided to issue the unallotted shares of the Company—namely, 1169 of their 6 per cent. preference shares of £5 each and 18,000 shares of £1 each—*pro ratâ* among the existing holders.

The Public Service Commission have approved the proposal of the Consolidated Gas, Electric Light, and Power Company of Baltimore for an issue of $3,697,912 additional common stock at the rate of one new share for every five preferred and common shares held by stockholders. Notices containing details of the issue are being mailed immediately to all stockholders. Owing to the existing Treasury regulations, holders on this side are debarred from subscribing; but applications will in due course be made for permission to deal in the rights on the Stock Exchange.

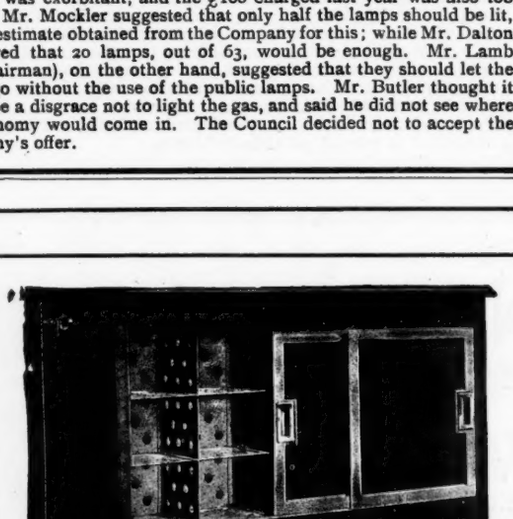

Illustration shows Gas Heated Hot Closet admirably suited for warming workmen's dinners. It is divided into 60 compartments or lockers, each 8 in. × 6 in. × 8 in., with perforated sides, and constructed with steel plates, atmospheric gas burners in top, centre, and bottom, with separate taps.

By Appointment Ironfounders to H.M. the King.

Munition and other Manufacturers

who recognise the importance of providing efficient cooking equipment for their workers will find their requirements amply catered for in

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installed in the largest and leading munition factories throughout the country.

The Company's No. 6k Catalogue contains the names of over 300 of the leading HOSPITALS, HOTELS, HYDROS, ASYLUMS, WORKHOUSES, CLUBS, etc., equipped with CARRON APPLIANCES, and their adoption by the MILITARY AUTHORITIES at home and on the Continent is further proof of their merit.

Prompt deliveries, drawings and estimates for Special Cooking Equipments free on application.

CARRON COMPANY WORKS: CARRON, STIRLINGSHIRE.

Contractors to the Government.

Showrooms:—London (City): 15, Upper Thames St., E.C.; (West End): 50, Berners St., W.; Liverpool—22-30, Redcross St.,; Glasgow—125, Buchanan St.; Edinburgh—114, George St.; Bristol—6, Victoria St.; Newcastle-on-Tyne—13, Prudhoe St.; Birmingham—218, 220, 222, Corporation St.

The Dundalk Rural Council have adopted plans for the extension of the town water supply to Castletown.

The Local Government Board have given permission to the Burton-on-Trent Town Council to borrow £2000 for the installation of benzol recovery plant at the gas-works.

Injury to the extent of between £5000 and £6000 was recently sustained to two holders belonging to a large Yorkshire gas undertaking. Messrs. Robert Dempster and Sons, of Elland, have been instructed to proceed with the work of repairing the damage, which is covered by insurance.

STOCK MARKET REPORT.

The Stock Exchange had a very quiet time last week, even quieter than what is about the normal run of things at this season of the year, and for the greater part of it the tone, except in certain special lines, was rather dull. This was more the effect of sheer inanition than of any active depressing factor. The war news alone, especially from the Western front, was sufficient to have stimulated free rises in ordinary circumstances, and other things were favourable, so that the cause must be looked for elsewhere. And this cause appeared to be a general disposition to "wait and see." None seemed in a hurry to sell, and very little stock was on offer, while none seemed in a hurry to buy, except in a few speculative lines at what were believed to be good bargain figures. Besides—as was observed last week—a great deal of money, which might otherwise be available for Capel Court, is going directly into patriotic issues.

In these circumstances, Government issues moved unevenly, and War Loan and Consols, after a firm opening, became easier until almost the close, when they partially recovered. Home rails were weaker, in view of the threatening aspect of the wages question and a fear lest the Government refuse to recognize the fairness of reviewing rates. Americans and Canadians were better, though the upward pressure in Wall Street came too late to be felt here.

In the Foreign Market, the French Loan was firm, and Japanese made further progress upward; but Brazilian receded on a fall in the exchange. South Africans were irregular. In the Miscellaneous Market, rubber, oil, and metals did well; but textiles were easier.

Business in the Gas Market was on a very small scale—in fact, but for some activity in South Metropolitan, it would have been next to nothing. The good tone, however, was quite unimpaired by inactivity. Changes in quotation in London were mostly *ex div.* variations. But in the Provincial Exchanges, Newcastle rose 1, and the three Sheffield issues rose 7.

In the Money Market, there was a good demand in the first half of the week; but rates eased before the close. There was a reduced demand for Exchequer Bonds, and issues of longer dates were more in request.

Bargains done for cash during the week were as follows: On Monday, Bournemouth "A" 25, ditto "B" 11½, Gas Light ordinary 80, 80¼, 80⅜, ditto maximum 60, 60⅜, ditto preference 74⅛, 74⅜, South Metropolitan 84¼, 84⅜, 85. On Tuesday, Cape Town 1¼, Gas Light ordinary 80¼, 80⅜, South Metropolitan 84¼, 84½, 84⅜, 85, ditto debenture, 59⅜, 60. On Wednesday, Gas Light debenture 60⅜, 61, Imperial Continental 92, Primitiva preference 71s. 3d, South Metropolitan 84, 84⅜, 85, ditto debenture 59¾. On Thursday, European 13, 13 1/16, 13⅛, Gas Light ordinary, 80¼, 80⅜, 80⅝, ditto preference 74½, Newcastle 81, Primitiva preference 72s. 6d., 73s. 9d. South Metropolitan 84, 84⅛, 84⅜, ditto debenture 60¼. On Friday, Gas Light ordinary 80⅜, Imperial Continental 90½, 91, South Metropolitan 84¼.

The Bank rate is 6 per cent.—as fixed on July 13.

At Peak Dale, near Chapel-en-le-Frith, a man was taking a short cut home, when he accidentally touched a live wire, and was electrocuted.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When Dividend.	Previous Div or Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4	Aldershot 4 p.c. Pref.	..	65—70	..
1,551,898	,,	April 8	2½	5¼	Alliance & Dublin Ord.	59—64	64—66	..
874,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—79	6'—65	..
280,000	5	April 29	7½	3/-	Bombay, Ltd.	5⅛—6⅛	5—5½	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c.	29—30	25—27	25
333,110	10	,,	7	7/-	B 7 p.c.	15—15½	11—11½	11½
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	9½—10	..
159,740	—	—	—	4	4 p.c. Deb.	..	73—75	..
992,045	Stk.	Feb. 26	†14	55/-	Brentford A Consold.	261—266	86—88	..
734,920	,,	,,	†11	53/9	Do. B New	204—209	83—85	..
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	85—90	..
221,400	,,	June 11	4	4	Do. 4 p.c. Deb.	91—98	..	..
217,380	Stk.	Feb. 26	11	10⅜	Brighton & Hove Orig.	208—213	1'5—165*	..
244,200	,,	,,	8	7⅜	Do. A Ord. Stk.	154—159	121—124*	..
630,000	20	Mar. 26	12½	22/6	British	44—45	35—36	..
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	71—73	..
245,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	60—65	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	1½—1⅝	1½
100,000	10	—	—	4/6	Do. 4½ p.c. Pref.	4—6	4½—5	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	87½—88½	..
1,518,280	Stk.	Feb. 12	5,9/4	49/4	Commercial 4 p.c. Stk.	106—108	72—74	..
560,000	,,	,,	5⅛	46/8	Do. 3½ p.c. do.	103—105	68—70	..
475,000	,,	June 11	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	55—57	..
800 000	Stk.	,,	4	—	Continental Union, Ltd.	76—79	36—38	..
200 000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—57	..
278,400	—	—	—	11½	Croydon B and C 7 p.c.	..	175—185	..
—	—	—	—	—	Do. E	..	..	..
492,270	Stk.	—	6	5⅜	Derby Con. Stk.	128—135	1'0—105	..
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	80—83	..
1,009,180	10	July 29	10	7/6	European, Ltd.	17½—18	12½—13½	13—13⅛
16,318,430	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord.	93—102	80 8	80—80⅜
2,600,000	,,	,,	8½	3½	3½ p.c. max.	76—79	59—61	60—60⅜
4,062,235	,,	,,	4	4	4 p.c. Con. Pref.	96—99	73—75	74¼—74½
4,674,860	,,	June 11	3	3	3 p.c. Con. Deb.	72½—74½	59—61	6[illegible]—61
130,000	,,	,,	10	10	10 p.c. Bonds	..	..	..
258,740	Stk.	Mar. 12	5	4½	Hastings & St. L. 3½ p.c.	87—89	78—83*	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16⅝	8—9	..
86,500	—	—	—	9½	Hornsey 7 p.c.	..	125—135	..
181,000	Stk.	Mar. 12	7⅛	7⅛	Ilford A and C	151—154	112—117*	..
65,780	,,	,,	6⅜	5⅞	Do. B	115—118	103—108*	..
65,500	,,	June 26	4	4	Do. 4 p.c. Deb.	92—94	73—76	..
4,940,000	Stk.	May 14	9	4½	Imperial Continental	150—160	86 93	90½—92
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	65—67	..
235,242	Stk.	Mar. 12	3½	6½	Lea Bridge Ord. 5 p.c.	119—121	87—92	..
2,498,905	Stk.	Feb. 26	10	5	Liverpool 5 p.c. Ord. { a / b	211—218 / 146—148	87—83	..
306,083	,,	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	78½—79½	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	4—4½	..
250,000	100	April 1	4½	4½	Met. of Melbourne 4½ p.c. Deb.	93—101	91—99	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8⅜—9½	..
1,375,892	Stk.	July 29	4½	4½	Newc'stle&G'tesh'd Con.	93½—99½	80½—81½	81
532,735	Stk.	June 26	3½	3½	Do. 3½ p.c. Deb.	85—88	75—77	..
55,940	10	Feb. 26	7/14/0	7/6⅝	North Middlesex 7 p.c.	117—122	10[illegible]—110	..
800,000	Stk.	May 14	8	8	Oriental, Ltd.	7½—7⅝	2—3	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	123—131	92—97	..
60,000	50	Feb. 26	18	60/-	Portsea, Island B	118—121	92—97	..
100,000	50	,,	12	55/-	Do. C	..	..	..
52,000	50	,,	10	—	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5¼—6	2—2½	..
499,960	5	June 26	5	2/6	,, 5 p.c. Pref.	4⅝—5	3½ 3	71 3—73/9
521,600	100	June 2	4	4	,, 4 p.c. Deb.	91—98	80—82	..
—	—	—	—	4	,, ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	60—65	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	8½—8⅞	..
125,000	50	July 1	5	5	5 p.c. Deb.	47—49	43—45	..
135,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	188—1 2*	..
309,984	,,	,,	10	10	Do. B	223—224	188—192*	..
523,500	,,	,,	10	10	Do. C	220—222	188—192*	..
90,000	10	May 28	9	10/-	South African	10½—11½	..	..
6,609,895	Stk.	Feb. 10	5/4/0	44/-	South Met., 4 p.c. Ord.	111—113	83—85	84—85
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	72½—74½	59—61	59⅝—60½
224,830	Stk.	Feb. 26	8½	8	South Shields Con. Stk.	157—159	152—154	..
952,795	Stk.	Feb. 26	6	4⅜/4	S'th Suburb'n Ord. 5 p.c.	114—116	80—82	..
60,000	,,	,,	6	5	Do. 5 p.c. Pref.	110—112	79—81	..
135,000	—	—	—	4⅜/4	Do. West Kent.	..	..	..
187,558	,,	June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	90—92	..
647,740	Stk.	May 14	5	5	Southampton Ord.	99—102	90—95	..
120,000	Stk.	Feb. 12	7½	7½	Tottenham District { A 5 p.c.	135—138	120—123	..
782,275	,,	,,	6	5⅝	B 5½ p.c.	116—117	90—92	..
181,255	,,	June 26	4	4	4 p.c. Deb.	87—89	73—75	..
183,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	98—95	60—65	..
236,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	103½—109½	93½—94½	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8⅜	78/9	Wandsworth A 5 p.c.	151—158	117—122	..
255,636	,,	,,	6⅞	63/9	,, B 5½ p.c.	129—134	101—102	..
108,075	,,	,,	5/17/8	55/1½	,, O 5½ p.c.	110—115	88—93	..
852,000	,,	,,	6½	57/6	Wimbledon 5 p.c.	117—122	93—98	..
98,000	,,	,,	6⅜	63/9	Epsom 5 p.c.	121—126	98—103	..
88,416	,,	June 26	8	8	3 p.c. Deb. Stk.	66—69	53—56	..

* Ex. Div. † Paid on Old 10 p.c. and 7 p.c Standard Stocks.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Assistant Engineer. Derby Gas Company. Applications by Sept. 21.

Outdoor Superintendent. Derby Gas Company. Applications by Sept. 21.

Chemist (Head). No. 6220.

Erector and Repairer, &c. Desborough Gas-Works.

Draughtsman. Labour Exchange, No. A2331.

Draughtsmen. Labour Exchange, No. A2221.

Pupil Wanted.

Gas Engineering Firm. No. 6222.

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Meters. No. 6221.

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Electrical Engineering Courses.

E. A. Mansfield and Co., New Brighton.

Gas Examination Courses.

Mr. Cranfield, Nuneaton.

Meeting.

British Gaslight Company. 11, George Yard, Lombard Street, E.C. Sept. 27. Twelve o'clock.

Wanted.

Carbon. No. 6192.

Coke. Davies, Crosskeys, Mon.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
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SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
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See Illustrated Advertisement, Aug. 15, p 286.

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We Guarantee promptness with efficiency for Repairs.
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GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

DEFENCE OF THE REALM ACT.

TO comply with Regulation 8 (*b*) of the above Act, advertisements from firms whose business consists wholly or mainly in Engineering, Shipbuilding, or the production of Munitions of War, or of substances required for the production thereof, must include the words "No person resident more than ten miles away or already engaged on Government work will be engaged."

ADVERTISERS SHOULD ALSO MAKE NOTE that, on and after Oct. 1, the taking of steps to obtain the services of an alien for work other than munitions work in the United Kingdom is prohibited except with the permission of the Board of Trade.

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5, CROOKED LANE, LONDON, E.C.

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Tins for sale to Consumers.
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CITY AND GUILDS GAS EXAMINATIONS.

MR. CRANFIELD'S well-known Correspondence Classes will shortly commence. During the coming Winter both the leisure to attend Evening Classes and the number of Gas Classes formed are likely to be less than formerly, and individual Instruction by post meets the case.
Full Particulars from MANOR COURT AVENUE, NUNEATON.

DERBY GAS LIGHT AND COKE COMPANY.

APPOINTMENT OF ASSISTANT ENGINEER.

APPLICATIONS are invited for the Position of ASSISTANT ENGINEER to the above Company. Salary, £350 per Annum, inclusive.
Applications, stating Age, Qualifications, and Experience, along with *copies* of Three recent Testimonials, to be sent to me, endorsed "Assistant Engineer," not later than Thursday, the 21st inst.
J. FERGUSON BELL,
Engineer and Manager.
Gas Offices, Friar Gate,
Derby, Sept. 6, 1916.

DERBY GAS LIGHT AND COKE COMPANY.

APPOINTMENT OF OUTDOOR SUPERINTENDENT.

APPLICATIONS are invited for the Position of OUTDOOR SUPERINTENDENT to the above Company. Salary, £225 per Annum inclusive.
Applications, stating Age, Qualifications, and Experience, along with *copies* of Three recent Testimonials, to be sent to me, endorsed "Outdoor Superintendent," not later than Thursday, the 21st inst.
J. FERGUSON BELL,
Engineer and Manager.
Gas Offices, Friar Gate,
Derby, Sept. 6, 1916.

DRAUGHTSMAN, used to preparing Shop Drawings for Tank and Structural Steelwork, wanted by Firm engaged on important Admiralty and War Office Work. State experience and salary required. No one engaged on Government Work need apply.
Write or reply to your nearest LABOUR EXCHANGE, mentioning No. A 2331.

DRAUGHTSMEN, Experienced, Wanted, for Coke Oven and Bye-Product Plants. Write, stating Experience, Age, and Salary required, Reference, and Military Status.
No Person on Government work will be engaged.
Apply to the nearest LABOUR EXCHANGE, quoting No. A2221.

HEAD Chemist required for a large Coking Installation, in Northern England, with Bye-Product Recovery, Tar Distillation, and Gas Plant. Applicants must not be of Military Age or already on Government Work.
Apply, by letter, to No. 6220, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.